Telephone Engineer

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From Publisher To Editor

DEAR R. C. R.

Just thought you would be happy to know that telephone men in the South and Southwest are enthusiastic over the new features in TELEPHONE ENGINEER.

Everywhere I go, there is commendation and praise for our efforts to give the telephone industry a more modern and up-to-date publication.

Our new cover, enamel stock, new inside make-up, together with our policy of publishing the most interesting and helpful editorial and news material are bringing favorable and enthusiastic comments from every corner in this section of the country.

This kind of genuine response well repays us for our effort and we pledge to the telephone industry that we will continue under the same progressive policies in the future.

Yours,

J. A. SMITH,

Publisher.

FAITHFUL GUARDIAN OF

The

"THE HOUSE IS SAVED"

"Get help! My house is on fire!" These are the excited words that came to a telephone operator from a farmer near Gothenburg, Nebraska. In the space of minutes, his neighbors were on hand. Quickly they formed a bucket brigade and saved the home.

In time of urgent need, emergency, catastrophe, you turn to your telephone. Over its wires you send your voice to doctor, veterinarian, neighbor. You use it to reassure and comfort an absent member of the family, to shorten the hours of the day with a social call. It brings the latest market reports, takes a hand in many business transactions, keeps you in touch with the outside world.

Day in and day out, your telephone is on the job. Its helpful service is invaluable to you on the farm.

A BELL SYSTEM ADVERTISEMENT

REASONABLE and LOGICAL Spending

IF WE don't miss our guess the day is coming—and our "hunch" is that it won't be long—that many telephone managers will be sorry that during the last half of 1933 they did not go through their plants and make a list of different items of equipment, supplies and repair parts that were and are going to be needed for regular maintenance and spring construction.

Apparently President Roosevelt is not to be shaken from his policy of raising prices to 1926 levels, which means that commodity prices are likely to take regular jumps until those levels are reached. It has been pointed out before that many commodity price boosts affect prices of telephone equipment and supplies.

We know that some companies haven't any money to spend today, but there are some that do have funds for this purpose, and frankly, if we were an operating man and had the where-with-all we would see to it that all our worn-out equipment was replaced immediately, if for no other reason than a protection against increasing prices.

We stated in the November issue of TELEPHONE ENGINEER that "spending is a reasoning process rather than a sentimental one." We maintain that spending now to affect savings in view of price increases is reasonable and logical.

It isn't too late yet. Considering the National Administration's declaration relative to commodity price policies, we believe it would be good business for telephone companies, financially able to do so, to replace worn-out and inefficient equipment NOW.

In order to be systematic and to know just what to purchase, it is suggested that an immediate survey of entire telephone plants be made and lists of all needed equipment and supplies be prepared.

R. C. Reno

EDITOR

The Telephone Business As We See It

Spare Time and Maintenance Preventive maintenance work, which Mr. Talmage discusses in his article in this issue, is nothing new, but we believe that more advantage should be taken of spare time during these lean days when every penny must be counted, to hold trouble and plant failures to a minimum.

Some managers say, "My plant men have no spare time." Our advice to them is to plan work in advance so carefully that spare time will be created. Then each plant man should be assigned specific responsibilities in the shape of definite plant items for which he alone is to find and cleanse of all potential faults.

Not only must this be done, but we must go still further and assign exact periods during which this routine inspection work is to be carried out. Otherwise the work may never be done if the plant man is instructed to take care of it "when he finds time."

We must have a well thought-out plan, and this plan must be religiously followed if anything worthwhile is to be accomplished in the way of preventive maintenance.

Of course, emergencies will arise which will interfere with the maintenance routine at certain periods. But during periods of excessive troubles and other unusual conditions the preventive maintenance work may be postponed until normal conditions again prevail.

A specific and consistent plan for maintenance work is justified as an economy measure as well as a sensible program of preventing the deterioration of telephone service. It is entirely possible by previous planning and scheduling work to do the job at a cost lower than it has been done in the past. Careful planning and training also will increase the production of any workman.

▲ ▲ ▲

Open Houses and Public Relations The Lincoln (Neb.) Telephone and Telegraph company is to be congratulated for its continued effort to build up its public relations in the various cities in which it operates via the telephone "open house."

For some reason fewer and fewer "open houses" are being held. In our opinion this is one of the best methods by which to effect a greater interest in telephone service and to maintain and build up a telephone company's relation with its public. When subscribers and non-subscribers see the intricate telephone equipment at work and understand the amount of detail and difficulty encountered in giving them efficient service they have a greater appreciation of the telephone company and its service.

The following newspaper announcement of the Lincoln company's "open house" at Superior, Neb., shows clearly how it can be played up and how interest can be stimulated. The mayor's proclamation is unique and adds dignity to the affair. The announcement in part follows:

"The romans behind the telephone—those scientific and physical factors that make communication possible—will be shown Friday and Saturday afternoon and evening, November 17 and 18 at the telephone office of the Lincoln Telephone and Telegraph company.

"An invitation to attend is extended by Manager Kubat and his associates to all the people of the community.

"The telephone company will have open house from 10:00 A. M. to 9:30 P. M., each day and invites any person interested regardless of whether he is a telephone subscriber or not, to be its guest. Visitors to the telephone central office will be shown the inner workings of the telephone system serving this city. They will see the various parts of the apparatus whose functions are coordinated in furnishing telephone service through that simple appearing instrument in their homes and offices.

"'In recognition of the fact that telephone employes, residents of the city of Superior and vicinity, are engaged in rendering the telephone service which is so vital in the social and business welfare of this community, and are interested in its continued progress of telephone, and have offered to dedicate their time to act as hosts to the citizens of this city, I therefore proclaim that Friday and Saturday, November 17 and 18, shall be telephone community service days, sincerely believing that such a public observation will be of unusual interest to the people of the city of Superior, and further urge every citizen of this community to accept the cordial invitation extended by the telephone organization to visit its building and observe how this essential and valuable public service is rendered.'

C. C. SCHAER, Mayor."

▲ ▲ ▲

If you know a person who plans to have his service reconnected "pretty soon" and can persuade him to give you an order now, you are doing a bona fide selling job every bit as much as if you made a sale to a person who had not planned to place an order.—*The Sales News.*

▲ ▲ ▲

In selling telephone service, we are successful in the proportion in which we make our prospects WANT the service.

TELEPHONE ENGINEER MARKS SILVER ANNIVERSARY

By

J. A. SMITH

Publisher

TWENTY-FIVE years! A quarter of a century! Doesn't seem so long ago, but what a lot of progress has been made in the telephone industry. Twenty-five years ago desk stand telephones resembled Kansas sunflowers in bloom and the wall telephone looked somewhat like a modern size clothes cabinet.

What a thrill it was to make the annual pilgrimage to Chicago and to talk with such men as Bert Hubbell of Buffalo, Charley North of Cleveland and "Uncle Dick" Valentine of Janesville, and countless others who were known in those days as aggressive Independent telephone men, making history and a place for the industry of Independent telephone men in the United States. Battles with the Bell organization over policies and the right to exist were recounted to an interested and willing audience and victories won were heralded as events worthy of emulation.

What a number of inventions and improvements have been developed since those days! Flying craft, radio and numerous other things thought impossible in those days are now commonplace. Modernized telephones with increased efficiency to meet present day needs, matched to the color schemes of the home! When one contemplates the improvements over the quarter of a century it certainly gives him that g-r-a-n-d and g-l-o-r-i-o-u-s feeling, to feel he has been a part of this great industry.

As publisher of TRANSMITTER of Fort Worth, Texas, it was our good fortune to enjoy the friendship of those responsible for the improvements and for the successful trend of the Independent telephone industry during the construction days after Bell patents had expired and Independent manufacturers entered the field. We have watched with interest the development of products, the rise and fall of manufacturers who entered the field and the sound footing upon which manufacturing is placed at this time. Experimentation is a thing of the past, practically all items entering the manufacture of telephones and switchboards have been standardized and the industry itself is on a sound financial basis. Independent and Bell companies now work in unison for the welfare of all and recognize that they must stand or fall as one industry.

As far back as twenty years ago the writer determined to own TELEPHONE ENGINEER. It was years before we realized our ambition, but the pursuit was worth the effort, and since attaining our ambition we have congratulated ourselves upon the foresight of long ago. Our problems have been similar to that of operators and manufacturers. To keep ahead of development has been our ambition and how well we have accomplished this feat is recounted in the volumes of TELEPHONE ENGINEER from year to year. Nothing has been left undone to assist both operator and manufacturer in the development and application of equipment.

Looking back over the quarter of a century since the inception of an idea to publish an engineering publication for the entire industry we find that the first issue of TELEPHONE ENGINEER was distributed in January 1909 as a publication with a mission "to treat fairly and impartially the whole wide domain of the telephone industry serving the art along the line of the best engineering, construction and operating practice."

These words appeared on the editorial pages of the first issue of TELEPHONE ENGINEER and through all these twenty-five years of service the publication has lived up to and has been true to that principle of fairness and impartiality as laid down by its founders. And—today it continues to give its readers the best in telephone engineering, construction and operating practices—and in addition it disseminates valuable information relative to the modern trends and progress in telephone management and commercial practices—giving the telephone industry a publication serving every branch of the business.

TELEPHONE ENGINEER began as a monthly publication and has continued as such throughout its life. It was the belief twenty-five years ago, as today, that a monthly publication evolves a more intensely practical editorial style. And—that out of a process of elimination and drastic rewriting comes conciseness, terseness, concentration—fewer words, more subjects, emphasis on practice, little theorizing. In other words, the news can be properly cleansed of all superfluities and "chaff."

Then, too, it was and is realized by the management of TELEPHONE ENGINEER that a monthly publication best serves the interests of the entire industry because every issue gives both readers and advertisers a 30-day life.

Observance of its Twenty-Fifth Anniversary is not complete without a word relative to TELEPHONE ENGINEER'S independence. Today, as in the past, the publication operates on the principle of serving those who have the best interests of the industry at heart. TELEPHONE ENGINEER has always decided its own policies and has executed them without fear of any faction, group or organization. At all times, in the execution of these policies, consideration has been given the "little fellow" as well as the "big fellow."

The management of TELEPHONE ENGINEER prides itself on the fact that there are so many telephone operating men who are holders of TELEPHONE ENGINEER'S stock and who have a voice in the management of the publication. It is believed it is to the best interests of the industry to have a publication guided by members of the operating field rather than by a "closed" corporation.

As a fitting celebration of its Twenty-Fifth Anniversary—as the latest steps in its twenty-five years of steady progress—TELEPHONE ENGINEER presents several unique improvements including a new modern cover design, new inside typography and enamel paper stock throughout, continuing the progressive policy that has guided the publication since its inception. It is indeed a great pleasure to give telephone readers and advertisers a more interesting, more valuable and more up-to-date trade publication on our Silver Anniversary.

We start our second twenty-five years by thanking our friends—our readers and advertisers—for their support in the past and earnestly soliciting their co-operation in the coming years.

REDUCING "GUESS FACTOR" IN MAINTENANCE

Engineering Defined as "Previous Careful Planning" — Telephone Service Influenced by Maintenance of Central Office Equipment — Use of Test Pad in Economic Control of Maintenance Practices — Resulting Operating Benefits.

By
T. DeWITT TALMAGE

AS MANY telephone men know, there have been practices in former days which were based on casual observation, limited experience and infrequent interchange of ideas, and, perhaps if the truth were known, quite a bit of intuition rather than a complete knowledge of the facts that were involved. Some of these unsound practices were founded upon "hunches". Such of these methods as were inefficient were thorns in the sides of managements which were sincerely striving to furnish good telephone service in an economical manner.

Today, because of the dire need for reducing operating expenses, there is a temptation to follow somewhat similar methods in curtailing maintenance work in spite of the fact that no telephone system can function satisfactorily for any length of time without keeping maintenance activities reasonably in step with the passing of time. Yielding to this temptation is bound eventually to result in a lower grade of telephone service.

Non-Maintenance Expensive

The hazard in deferring maintenance is generally realized. Maintenance work can be postponed only for a relatively short time, provided the company starts from a comparatively high level of equipment condition, but if equipment and plant are calling urgently for repairs, deferment of maintenance is extremely risky and usually expensive in the long run. One of the smaller, but nevertheless important, items of equipment frequently neglected is discussed in this article.

Telephone engineering has been defined as the study and planning of construction, upkeep, operation and maintenance of the telephone plant in order to insure economic and efficient delivery to the public of the commodity of telephone service. There are numerous other definitions of engineering and among the more concise is the one made by the dean of an engineering college I attended, when he boiled down the varied and complex definitions to the brief statement that engineering was merely "previous careful planning."

Lack of system in planning repair work is a weak spot in many otherwise efficient organizations. There is no doubt but if more "previous careful planning" were applied to maintenance activities repair work could be better done and at less cost than it is now being done in many cases.

C. O. Plays Part

Central office equipment plays a vital part in the shaping of the telephone using public's impression of the grade of service being rendered, and it influences to a large extent the public's definition of telephone service. The operator's telephone equipment is the medium with which your operator delivers your commodity of quick and satisfactory communication to the public. Because there is a direct and positive relation between the efficiency of the operation's telephone set and the quality of service being furnished, it is essential that this equipment receives its due share of attention from the maintenance man.

The maintenance of the operator's equipment enters into the satisfactoriness of every telephone call made by the public, and it is necessary from the standpoint of ultimate economy, as well as good service, to periodically inspect this equipment in order to locate and eliminate troubles in the incipient or initial stage. That is, while the troubles may not be causing an impairment of service at the time, they may at some future time develop into serious faults if neglected.

While some of the advantages of the breastplate type of operator's transmitter are lost in the smaller central office where the operator leaves the switchboard frequently to attend to other duties, the tendency today seems to be toward the use of this equipment instead of the suspended type of transmitter, even in the exchanges serving the small communities.

Exasperates Public

A defective operator's headset can cause many service troubles. It is only natural for customers to become exasperated when the operator has difficulty in hearing them due to a faulty operator's receiver, and patrons are frequently asked to repeat when they are speaking clearly and distinctly. Such an unfortu-

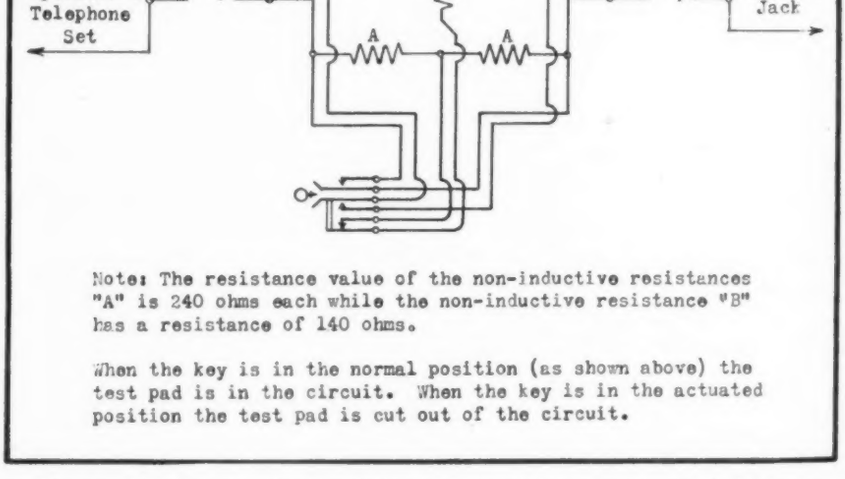

Answering Cord to Operator's Telephone Set
Test Jack
A
A
B
A
A
Test Plug
Line Circuit Jack
Note: The resistance value of the non-inductive resistances "A" is 240 ohms each while the non-inductive resistance "B" has a resistance of 140 ohms.
When the key is in the normal position (as shown above) the test pad is in the circuit. When the key is in the actuated position the test pad is cut out of the circuit.

Fig. 1. Diagram showing circuit for making talking tests to check the transmission performance of operator's telephone sets as well as subscribers' loops and stations. Test Pad used in above circuit has a transmission loss of approximately 20 decibels. Drop on line circuit omitted for sake of clearness.

nate condition means a loss of revenue, as well as a loss of goodwill, when a toll connection is involved, and the subscriber abandons the call in disgust. A faulty headset makes the operator's work more difficult and it is very trying on her nerves and patience.

In order to effect greater economy and reduce service complaints, more efficient maintenance methods must supplant haphazard work. Successful results which can be obtained by systematic and persistent endeavor prove that by properly directing efforts during spare or optional time, a man can get ahead of his trouble. If he waits until trouble is reported to him, it will often get ahead of him.

To assist repairmen in systematizing their work many companies have drawn up detailed instructions for the regular performance of certain tests and inspections. Work done on routine maintenance is preventive maintenance; that is, it catches the trouble before the equipment concerned is seriously affected or out of service entirely. It is a practical application of the old adage: "An ounce of prevention is worth a pound of cure."

What to Look For

Some troubles in operator's telephone sets can be detected and remedied by a visual inspection. Usually such visual inspections are warranted at least once a month on all headsets.

Operator's telephone sets should be inspected for: (1) frayed cords; (2) defective plug; (3) untied strings; (4) breastplate bent or in bad condition; (5) dented transmitter case; (6) defective horn socket; (7) foreign material on the transmitter; (8) loose receiver cap; (9) rusty, bent, dented, or reversed receiver diaphragm; (10) broken or damaged receiver case; (11) rusty or dirty pole faces; (12) foreign material in receiver; (13) loose, missing, or defective parts.

When inspecting the receiver remove the receiver cap. Before reassembling the receiver, the seating surfaces of the cap, case, and diaphagm should be wiped clean. Owing to the fact that removal of the breastplate from the transmitter may cause trouble not already existing, it is suggested that the breastplate be removed only when trouble is apparent in the transmitter.

Sterilizing the mouthpiece and ear cap at least once a month is conducive to the health and welfare of the operators. These parts can be cleaned with soap and warm water and then suitably rinsed and dried.

Noise and Cutouts

Test the cord of the operator's set for noise and cutouts. For this test arrange a test jack so that when the plug of the set is inserted in it, the receiver and transmitter will be connected in series with either a tone or a few volts of battery.

With the plug in the test jack and the receiver on the ear shake the cord and otherwise finger it. Cords should remain quiet when shaken and any clicks, scratches, or noise in the receiver indicate trouble. In this connection the most prolific source of trouble is usually found to be where the cord conductor is fastened to the cord tips. Replace all defective cords unless the wear or defect is found to be at the plug, transmitter or receiver terminal connections, in which case the cord can be cut back.

Each operator should have a headset for her individual use. Dustproof compartments should be provided for headsets when not in use. The operators should be instructed how to tie up their headsets properly. This will lengthen the period of usefulness of the headset and it will help to keep the set in good repair. All extra sets should be kept in standard condition at all times.

Efficient Replacements

Where the central offices are very small or in cases of P. B. X. switchboards which do not require a regular maintenance man to be constantly in attendance, the operator's set should be inspected at times when the offices are visited in connection with other maintenance work. It is suggested that where the number of sets involved is very small it may be found to advantage to provide sets which have previously been tested out for replacing the sets in use. The sets which are replaced should then be taken to the central office which is responsible for the maintenance of the smaller office and they should be tested out at that office.

After all of the inspections have been made it still remains necessary to test the overall performance of the headset. To determine transmission efficiency of receivers and transmitters is somewhat more difficult than measuring transmission loss of telephone circuits with a single frequency tone. Use of a single frequency tone, such as 1,000 cycles per second, in testing receivers and transmitters is not practical because diaphragms of this apparatus have a natural period of vibration, and at frequencies at which the diaphragms are resonant, response is much greater than at other frequencies. Consequently, single frequency tests are apt to be misleading as compared to tests which make use of the entire range of voice frequencies.

One of the simplest methods of making overall performance tests of operator's headsets is to make a transmission talking test over a special testing circuit shown in Fig. 1.

Equipment Needed

To successfully maintain a telephone plant it is necessary to have available some sort of testing equipment, however simple it may be, even in the smallest of exchanges. A simple and effective test for determining the transmission condition of magneto subscribers' loops and stations was described in the July issue of TELEPHONE ENGINEER. This test makes use of an inexpensive network of resistances called a "test pad" which has a transmission loss of approximately 20 decibels.

This pad is used for making transmission talking tests between central office and subscriber's instrument. Unsatisfactory performance and what is just about as undesirable, mediocre performance, of subscriber's equipment can be quickly and easily discovered by means of this simple testing plan.

This test pad, the details of which are set forth in Fig. 1, is also used for checking transmission performance of the operator's telephone set. The pad is merely inserted in a line known to be good, say, for instance, the manager's or wire chief's telephone, and if a satisfactory conversation can be carried on between operator and that station with the test pad in the talking circuit, then the performance of the operator's telephone set is sufficiently good to permit standard transmission to all customers including those on long, heavily loaded rural lines. Likewise, such a test will guarantee good service from the headset over inter-city and toll circuits whose transmission losses are within reasonable limits.

(*Please turn to page* 34)

JUST A THOUGHT

There was a business depression in 1857 lasting twelve months; in 1869 lasting eight months; in 1873 lasting thirty months; in 1884 lasting twenty-two months; in 1887 lasting ten months; in 1893 lasting twenty-five months; in 1903 lasting twenty-five months; in 1907 lasting nearly twelve months; in 1914 lasting eight months; in 1921 lasting fourteen months.

The important thing about these past panics, however, is that every one of them has been followed by flush times, and the longer the depression lasted, the longer and more active the "boom". The present depression (since August 1929) has now lasted over 40 months. We can hardly say that the "boom" which will surely follow it has begun, but there are many favorable indications now.

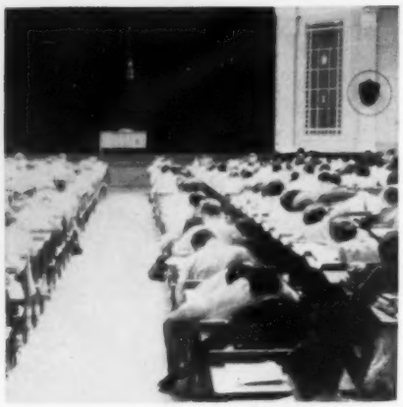
WHY NOT SELL, RENT

By

R. C. RENO

Editor

Telephone Engineer



Auditorium of a high school showing shield type dynamic loud speaker (in circle at right) and condenser microphone (in circle above stage). Loud speakers are usually placed on both sides of an auditorium.

ALERT telephone operating managers have been keen to investigate every possibility of increasing their revenue in legitimate and ethical ways. This has been especially true during the last few years when telephone subscriber lists have shrunk alarmingly and the sources of income have been curtailed.

This article, which is the second of a series on telephone revenue producing products, and the following two will discuss three products which telephone companies can merchandise to build up their shrinking revenues. This article deals with program service systems and the next two will discuss paging systems and public address systems.

These three products are members of the communication family and are very closely allied with telephone systems. In view of this fact it follows that telephone companies deserve any revenue that can be derived from the merchandising of them.

A program service system is essentially a voice and sound reproducing system, designed for use in public and private institutions to transmit voice messages or musical programs, originated at a central point, to every part of the respective institution.

A typical system usually consists of three equipment divisions:

1. **Originating Equipment to produce programs such as the microphone, phonograph, radio receiver, or wired source.**
2. **Amplifier Equipment which provides for amplifying low level program sources to higher levels and sufficient power to operate the sound reproducers which are connected to the main amplifying equipment.**
3. **Reproducer Equipment such as loud speakers, or head sets which deliver the program to the location desired at sufficient volume to meet the requirements.**

The truth of the statement that program service systems are closely allied with telephone systems readily can be seen by an analogy of the P. B. X. The originating source of the program service system represents the P. B. X. operator, the program service system's amplifying equipment represents the P. B. X. switchboard and the program service loud speakers represent the telephones connected to the P. B. X. board.

Furthermore, the wiring plan and layout of a program service system is almost identical with that of a P. B. X. installation.

Therefore, it seems obvious that telephone companies are the logical people in their communities to sell or rent systems of this type. Let us consider some of the reasons. First, they are the communication centers of their communities. Secondly, they are equipped to install the wiring for the systems as the installation is nearly identical with the P. B. X. installation. The hanging and maintenance of loud speakers is no more difficult than that of telephone instruments, while the connecting of the P. B. X. itself is possibly more difficult than that of the program service amplifier, because such accessories as batteries and ringing machines are necessary in the case of the P. B. X., while the amplifier unit source of power is derived by plugging into an electric light socket.

The question of maintenance then arises. A modern program service panel is no more difficult to maintain or more expensive to operate than a modern high grade radio set. While many larger telephone companies demand that their technical men have a working knowledge of radio, because of modern toll repeaters and allied equipment, it is not even necessary to have such a man in the organization in maintaining program service equipment. The experienced telephone technician can easily adapt himself to this work.

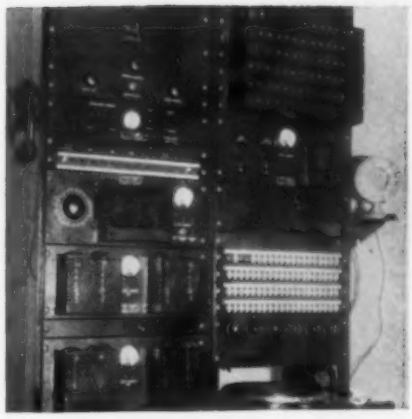
In the case of telephone companies in smaller communities, radio servicing can now be had easily and that is really all that program service involves from this standpoint.

Now we come to the potential market for program service systems. This point must be given utmost consideration. Almost every telephone company has a market for this type of product, because they are rapidly being installed by schools, hotels, prisons, factories, hospitals and other public and private institutions the country over. Telephone companies can secure a great amount of revenue by selling or renting these systems to these types of institutions. In the majority of cases, the telephone men are well acquainted with the heads of these organizations, which puts them on a sound selling basis at the start.

2nd Article Of a Series
On Revenue Producing Products

PROGRAM SERVICE?

Telephone Companies are Urged to Look Into the Possibilities of Increasing Their Revenues by Merchandising Certain Communication Products Immediately. A Good Time to Begin a Campaign of This Type is the First Month of the New Year. Let's Make 1934 a "Revenue Producing" Year.



Program Service Panel showing radio receiver, amplifiers, phonograph, switching keys and announcing microphone. From this panel the principal of a school may broadcast to school rooms. Musical programs also may be broadcast.

Selling or renting of these systems is essentially a matter of explaining and showing just what they will do for the user and to convince him that the purchase price or rental costs are small and economical compared with the opportunities they give him to increase the efficiency of his organization.

If we take a typical program service installation for an example, such as in a school, it will give us a more lively conception as to the requirements and the wonderful aid, convenience and pleasure such a system provides.

The principal of a school is usually provided with a close speaking microphone to enable him to give instructions directly to the teacher in any class room, or all class rooms at the same time via loud speakers. A broadcast microphone is provided for the auditorium so that pupils may be taught the use of this instrument as well as to provide a source of programs to all class rooms from the auditorium stage if so desired.

At some convenient place near the central amplifying panel, a phonograph may be provided so that high grade music can be furnished through loud speakers for study, or marches can be impressed for drills. The phonograph may be moved to the auditorium for providing music during plays, dances or games when an orchestra is not available. The phonograph may be of the automatic multiple record changing type or of the single record electrically operated type.

At the main panel a radio set of high quality is usually installed so that programs of interest to schools may be impressed to the speakers. Such programs are readily obtainable and include such fine offerings as the Damrosch Hour, presidential addresses, School of the Air Programs, civic and philharmonic orchestras.

It is likewise possible to have two or more radio sets so that two or more separate programs may be picked up at the same time and passed along to such rooms as may desire to listen to them. In the music room and auditorium it is, of course, desirable to have reproducers of high quality so that the fidelity of the original program may be carried directly to the ear of the listener.

These systems may be installed similarly in other institutions. Whether we like to or not, we all must admit that during the last few years whole telephone systems have been removed from schools and other institutions, leaving only one or two stations to take the place of a fine P. B. X. system. This curtailment of telephone revenue is severe in many cases. By being able to offer the school board a system such as program service equipment the telephone company stands a good chance to keep a big part of this revenue, if not all of it.

As we see it these systems do not conflict with the selling of telephone service, on the other hand we regard them as a complement to the latter. Telephone companies should be in a position to realize financially on this type of service when telephone service is discontinued because of necessity. Telephone companies also have an opportunity that the ordinary electrical contractor does not enjoy and that is the linking of several schools together by wired service between them.

Program service systems can be classed as permanent installations, much on the order P. B. X. where revenue extends over periods of months and many times over years. It also provides for increased revenue, year by year, as the institution which it serves grows and expands.

The main point of consideration is that these systems are bound to be sold by electrical contractors and radio men and every year finds the saturation mark of the market a little closer. We believe it logical for telephone managers to go out and get their share of this business, which rightfully belongs to them.

If this brief article has been any spur to telephone men to investigate the possibilities of program service, the following note of warning may not be amiss. In selecting equipment it is well to consider apparatus of high quality, well designed and constructed, and to know that it is manufactured by a reliable firm which is permanently established in its field.

In the past, program service systems have been advertised in TELEPHONE ENGINEER, and we are in a position and will be glad to furnish further information regarding this equipment, and will direct telephone companies to manufacturers of this equipment.

Coming Next Month

Paging System-A Revenue Producer

RATING TRANSMISSION PERFORMANCE

By

W. H. MARTIN

From the January, 1931, issue of The Bell System Technical Journal

(Continued from November)

WITH the establishment of proper correlations between transmission service performance and transmission characteristics, these latter can of course be used to indicate service performance.

In addition to specifying any kind or grade of circuit performance on the basis of performance results there is the method, which has had important practical application, of indicating performance in terms of types of instruments and circuits and of the conditions of their use. For example, a statement of the types of transmitters, receivers, station sets and cord circuits and of the length and types of loops and trunk, together with specific conditions of use, provides an indirect specification of a performance. This method, which is extensively used in many fields, may be termed the "instrumentality designation method." An outstanding application of this method in telephone transmission work is the Standard Cable Reference System[1] which was so widely employed to provide a scale of performance.

This method has many present applications where physically determined characteristics are unavailable or are difficult of definite determination and specification. Also, the designation of instrumentalities is convenient in many cases because it provides a ready means of specifying a practical combination of various kinds of transmission characteristics. While this method is often expedient practically, taken by itself, it is inherently cumbersome for the development of improved instrumentalities because of the lack of physical indication of the features to be investigated.

Transmission Characteristics

The usefulness to the listener of the speech sounds reproduced over a telephone circuit is a function of their loudness, of their distortion or degree of departure from facsimile reproduction, and the magnitude and character of the extraneous sounds or noise which accompany them. Transmission characteristics are therefore directly primarily to indications of the effects of the circuit and its parts on the reproduction of sounds in these three respects. As already indicated, transmission characteristics are determined not only for the path from transmitter at one end to receiver at the other, but also for the sidetone and echo paths.

Speech sound transmission characteristics, that is, expressions of the relations between impressed and reproduced speech sounds, while they have been extensively used, present some difficulty in quantitative determination and specification because of their complex nature. Also, the human element is involved in the persons used as generators of the speech sounds to be investigated and as observers to give indications of loudness and distortion and of their effects on the recognition of the reproduced sounds. Two outstanding kinds of relations of this type are those given by volume tests and articulation tests, which will be discussed later. It has therefore been of great convenience to take a further step and to study and specify the performance of telephone circuits and their parts in terms of their functioning for single-frequency sounds and currents. In this procedure, this functioning is investigated for a number of different single-frequency sounds and currents, so taken as to cover the range of frequencies transmitted by the circuit. In the single-frequency transmission characteristics, the personal element is eliminated and the measurements are made entirely on a physical basis.

Speech Sound

A great deal of attention has been given to the correlation of speech sound and single-frequency transmission characteristics so as to enable the former to be derived from the latter and so extend the application of the type which is more readily susceptible to quantitative determination. Also, use has been made of easily specifiable multi-frequency sounds and currents to permit the physical measurement to approach more nearly speech sound conditions, of phonographic reproduction to reduce the personal factor in the generation of speech sounds for measurement purposes and of meter arrangements to simulate the ear ratings of sounds, particularly from the standpoint of relative loudness.

As a result of the correlation of speech and single frequency characteristics, extensive use has been made of determinations at selected typical single frequencies to check the design, installation and maintenance of lines and other associated circuit elements.

The widely used volume test is essentially a means of specifying the action of a telephone circuit or its parts, on the relation between the reproduced and impressed sounds from the standpoint of their relative loudness. In this test use has been made for many years of the Standard Cable Reference System and recently of the Master Reference System for Telephone Transmission[2] as references for comparison.

Input and Output

These reference circuits with their adjustable trunks provide a means of obtaining different loudness ratios between input and output sounds. By talking alternately over the reference circuit and the one being investigated and adjusting the trunk of the reference system until the output sounds of the two circuits are judged to be equally loud, a specification of the loudness reproduction ratio is obtained of the circuit under investigation in terms of the length of the trunk in the reference system. The effect of a change in the telephone circuit, such as the replacement of one receiver by another, is measured in terms of the change required in the reference trunk to give a loudness balance for the second condition. In this way, measurement are also obtained of the effect on the loudness reproduction ratio of the various parts of telephone circuits. When the circuits used commercially consisted of apparatus and lines similar to those in the Standard Cable Reference System and the major controllable factor was the loudness reproduction ratio, such measurements constituted reasonably adequate means for indicating the comparative functioning of circuits and apparatus.

The noise on a telephone circuit may be measured in various ways. The method which has been most generally used is that of comparing it with the controllable output of a fixed source of a complex wave shape and adjusting this output until it and the line noise are judged to have equal interfering effects.

1—"Master Reference System for Telephone Transmission," Martin and Gray, *Bell System Technical Journal*, July 1929.

2—See Reference (1).

With the availability of circuits and apparatus having widely different distortion effects, the volume ratings became insufficient for indicating the relative performances of commercial circuits. The earliest method used in rating distortion effects was one in which observers listening to transmission over the circuits, gave judgments as to their relative merits. By so comparing various kinds and amounts of distortion, two at a time, relative ratings can be established for placing them in order of merit.

Useful in Early Days

This procedure was particularly useful in the early days in working out the designs of transmitters and receivers, especially from the standpoint of locations in the frequency range of their points of maximum response. While such a judgment method has the shortcoming of not providing quantitative ratings it has been found that experienced observers can in general obtain results which are relatively consistent with the results of more definite measuring methods. Such judgment comparisons of distortion effects are frequently used, particularly in exploratory work, and are still more or less necessarily relied upon in setting limitations on circuit properties which primarily affect the naturalness of reproduction.

To provide for the need of a method for measuring the relation between the reproduced and impressed sounds from the standpoint of effects of different kinds of distortion, use has been made of the articulation testing method.[3] In this method, which has been widely used in recent years, lists of syllables, usually meaningless monosyllables, are called over the circuits to be rated and the percentage of syllables correctly understood is taken as a measure of the circuit performance. This testing method thus offers a means of indicating the distortion effects of circuits in terms of the recognizability of the reproduced sounds of speech. Probably one of its first applications[4] was in determining the cutoff frequency to be used in the design of coil loaded circuits.

Powerful Tool

The articulation testing method provides, of course, quantitative measures in terms of the recognizability of the reproduced sounds of speech not only of distortion effects, but also of the effects of the loudness of these sounds and of the noise which may accompany them. This method has provided a very powerful tool for investigating the effects of changes in the reproduction characteristics of telephone circuits on the recognition of the reproduced sounds and has been particularly useful in indicating the lines to be followed in reducing causes of distortion in circuits and apparatus and in evaluating the impairment caused by noises on telephone circuits. It has been recognized, however, that while such measurements indicate the capabilities of the circuits in reproducing recognizable speech sounds, they do not in themselves give direct measures of the degree of success while the users of the telephone obtain in conversations where their actions are free from the control which is necessary in articulation testing and where the contextural relation of the words plays such a large part in their recognition. To make the results of this type of testing approach more nearly the conversational results, words and sentences have been used in place of the meaningless syllables but it is evident that even with sentences, the control on the actions of the tests and on the ideas to be communicated presents a condition which is quite different from those of regular conversations.

Useful Applications

All these ways of investigating and measuring the performance of telephone circuits in reproducing sounds have useful applications in present day transmission. Frequently it is convenient to use different methods for the various parts of a circuit in specifying the complete functioning of the circuit in reproducing sounds.

From the standpoint of the users of the telephone circuit, the transmission performance is measured by the success which they have in carrying on conversations over the circuit. Different degrees of success in this process may be taken to understand the ideas transmitted over the telephone and by the amount of effort required on the part of the users to impart and receive ideas. Service performance is of course affected also by accidental irregularities in circuit conditions such as interruptions and cutoffs, but from the standpoint of transmission design, attention can be concentrated on the results obtained when the circuit is in normal operating condition. Since failures to understand and exertion of effort are experienced also in direct conversations, their occurrence in telephone conversations obviously cannot be entirely ascribed to the functioning of the circuit. Variations in these factors for different types of circuits can, however, be used as a measure of the effect of the differences in the transmission characteristics of these circuits.

The repetition required in a conversation can be noted but a determination of the effort factor presents difficulties. There is undoubtedly the tendency in carrying on conversations as in other activities, to exert no more effort than is necessary to obtain what the participants consider to be satisfactory results. This effort, however, will in general be increased as the difficulty of conversing becomes greater and so bears a relation to the increase in repetitions. Also, it is probable that two dissimilar circuits which cause the same rate of repetition when used for the same service, will, on the average, call for the same amount of effort by their users.

A Direct Measure

In line with this, the rate of occurrence of repetitions requested by the users of a particular telephone circuit in carrying on their regular telephone conversations can be used as a direct measure of the service performance of the circuit. By determining the repetition rate for a large enough number of different people at the two ends to take account of the variability of their personal characteristics in talking and listening to the telephone and of the conversational material and conditions, a rating can be placed on the service afforded. By making such observations on connections having different transmission characteristics, relative ratings can be established for these various transmission characteristics.—*The Bell System Technical Journal.*

(To Be Continued in January)

The Use of the Telephone

"Typical of this nation's ready acceptance of mechanical convenience," says a recent editorial in The New York Evening Post, "is the universal use of the telephone, set forth in figures which show that 56 per cent of all the world's telephone numbers are listed in the United States. The number of phones per capita, or 'telephone destiny' of this country is eight times that of Europe. Canada comes second in this respect and Denmark third. The usefulness of the telephone increases according to the number of telephones in use. It would be small advantage to possess one if there were nobody to call by means of it. This is an enviable industry, therefore, which can offer better service as it comes closer to the saturation point. With 15.8 telephones to every 100 persons in the United States, the saturation point is still some distance away."

3—"Articulation Testing Methods," Fletcher and Steinberg, *Bell Sys. Tech. Jour.*, Oct., 1929.

4—"Telephonic Intelligibility," Campbell, *Phil. Mag.*, Jan., 1910.

WHY IS A TELEPHONE CABLE FAILURE

By

JAMES W. TALBOT

CABLE failure can be due to any one of a number of causes, some rather freakish in nature. There was once a hay wagon which caught fire while driving along one of our highways, which then pulled to one side of the road, and the flames melted the aerial cable overhead. But in the great majority of cases they are due to water seeping into the cable through a crack, bullet hole, or some other opening, and so short-circuiting, crossing up, or grounding the pairs of wires within. Driving rains will create such a condition in aerial cables, and in underground cables failures are generally created by underground disturbances, such as broken water mains or electrolysis—the gradual eating away of the lead sheath of the cable due to electro-chemical action caused by stray currents.

Due to the concentration of the cable plant in the metropolitan centers, the cable failure is an emergency with which city people are more familiar. The failure may affect a good many of the lines within a cable all at once, or a line or two at a time, depending upon the particular cause of the failure. Other than this gradual affecting of the lines, no warning whatever is given of the impending emergency.

The short circuits and grounds caused on the majority of the lines in a failure produce the same effect in the central office as if the telephones on those lines all had their receivers lifted off the hook —except that the operator receives no response in reply to her "Number please" when she plugs into the jacks the lights of which have come in. In a dial office the senders (the mechanical operators) hang on to the lines waiting in vain for someone to dial them, and then after a wait of some seconds automatically transfer the defective lines to the test desk and signal the attendant.

In the manual office, the operator immediately reports to the wire chief the lines on which these "permanent signals" are coming in. In the dial office, the wire chief can himself readily tell by the signals that he is receiving just which lines are affected. By looking up the first few in the line card he can readily determine which cable is failing. The failure of a trunk cable will immediately make itself evident by the impossibility of completing calls over the trunks affected.

As soon as he has ascertained the cable that is failing, the wire chief calls the Cable Locating Bureau, connecting a good line and a bad line of that particular cable through his central office to the Locating Bureau, which is in the center of the city. This bureau then proceeds to determine the distance to the fault by means of loop tests. A repairman from the particular central office assisting in making the tests on the outside. The testman then plots these distances on the print of the particular cable. He has at his disposal complete prints of all cables in the city and the surrounding territory. This locates fairly accurate the precise spot of the failure and indicates the nearest manhole or pole.

While this is being done, the wire chief at the central office is having his men make tests of all the lines in the cable affected. This is done by merely touching a lead of a head telephone set to the two conductors of each line as they are terminated from their cables on the main distributing frame in the central office. All lines may be tested in rapid succession in this fashion, and those which fail to give the proper click in the head receiver are immediately opened at that point by removing the heat coils from the distributing frame, thus preventing the current from flowing out over the shortened or grounded pairs, and so reducing any heavy battery drain. This testing process is continued over and over again as long as the cable is affected.

When the Cable Locating Bureau has made its location of the failure, the construction superintendent is so informed. He dispatches the necessary splicing crews to the scene of the trouble. Generally, the seat of the trouble on underground cables is at or near a splice in a manhole, in which case it is frequently immediately apparent. The manhole is pumped out if necessary and the cable and splice are carefully examined for a possible sheath defect. If necessary, nitrogen gas is injected into the sleeve of the splice under pressure, so that the exact location of any sheath defect may be detected by escaping bubbles. Where this test does not disclose the exact location of the defect, other tests are used, involving the opening of the sheath or splice. If a trouble locates in a section, the section is generally replaced.

When we consider that there are hundreds of miles of underground cable in the average metropolitan area, and that the greatest concentration of this is in the downtown section, which is so full of other underground construction, itself offering not only more agents that may cause cable failures but also more impediments in the way of clearing failures, we then get some inkling of the seriousness and magnitude of a failure in the downtown section, just where it is most likely to occur.

As mentioned above, the majority of cable failures are caused by water entering the cable through sheath defects, which is apparent as soon as the sheath is opened. In such a case, it is necessary only to "boil out" the cable. Hot paraffin is poured over and between the conductors, boiling off the water which may have moistened the paper insulation of the conductors and so created the short circuits. As this is being done, the tests of the central office men begin to show the lines coming clear, each subscriber being then informed as his line becomes O. K., with an explanation of the cause of the interruption to service.

When all the conductors at the point of failure have been properly reconditioned, the splicer calls the wire chief, who makes a final test of all the lines affected. Only after receiving a final O. K. from the wire chief will the splicer proceed to put the lead sleeve on the opening and wipe the joints.

The frequency of cable failures is constantly being reduced through increased and more efficient preventive maintenance. Routine inspection of all underground and aerial cables frequently detects incipient sheath and joint defects before they can do any damage, and their correction is immediately attended to. The method of testing cables by means of compressed nitrogen gas, which is practically free of moisture content, detects many incipient defects which would not be detected by visual inspection. Electrolysis is another enemy to underground cable, and its ill effects may take various forms. Ground potential tests are made periodically for detecting posi-

(*Please turn to page 34*)

LINE and DESK

Ray Blain, A. I. E. E., Editor

Q.—What type power ringing equipment is recommended for use in a small common battery telephone exchange?

A.—Either rotary or vibrating machines may be used satisfactorily. It is always advisable to have the regular machine operate off of commercial power and the standby operate off of the storage battery so that ringing current will be available one hundred per cent of the time.

Q.—What is the universal cord circuit and what is its purpose?

A.—The universal cord circuit provides good transmission when a common battery line is connected to a local battery line. When one of these cord circuits is plugged-up on a common battery line it feeds out battery in the usual manner but when plugged-up on a local battery line the subscriber talks with the local battery in the same manner as when connected to another local battery subscriber.

Q.—What is the usual current carrying capacity of switchboard fuses?

A.—This will depend on the type and manufacturer of switchboard used. They are usually ½, ⅓, 2 and 3 amperes. Circuit drawings generally indicate the size fuse to use in each case which should be strictly observed.

Q.—What is the best method of cutting clay conduit on the job?

A.—Various methods are used but one we have always found satisfactory is to pack the conduit full of wet sand and then take a masons hammer or cold chisel and mark all around the conduit where it is to be cut by tapping lightly. Continue this tapping until the conduit breaks all around which will generally be fairly straight. When using the cold chisel it is best not to strike it with a hammer but hold it in the hand and hit as with the masons hammer or the chances are that too hard a blow will be struck and the conduit will break crooked.

Q.—What is the best method of drilling holes for cable entrances through stone and brick walls?

A.—Electric hammer drills will be found ideal for this purpose and much faster and cheaper than the old fashioned hand method. Star drills are generally used in these hammers although the hollow type drills is rapidly gaining in favor. No telephone exchange that has much stone drilling to do can well afford to be without a good electric hammer drill.

Q.—When breaking-off of an open wire lead with a twisted pair drop wire is it satisfactory to make the drop wire tie directly on the open wire insulator?

A.—That is the common practice and can be considered fairly satisfactory when the drop connects to the outside pins on either side of the lead. In general though it is best to place a knob on the side of the crossarm for deadening the drop wire.

Q.—Is the use of test or bridging connectors considered good telephone practice?

A.—Considerable trouble in the past has been traced to these connectors and they are in general disfavor by many telephone companies. However, due to many improvements made by manufacturers during the past few years their use can now be recommended and if properly installed will be found entirely satisfactory.

Q.—What can be considered the limit of good transmission in a circuit?

A.—Usually the overall equivalent of a circuit should not be greater than 30 decibels for commercial transmission. When increased appreciably above this figure the attenuation is so great that conversation over the circuit is barely possible.

Q.—What is meant by marginal relays?

A.—They are made use of for marginal operation in specially designed circuits. Marginal means they will pull-up, or operate when the current reaches a certain value and fall back to a non-operated position when the current reduces to a value, less than the operating value.

Q.—How should a ground wire be proteced where it passes through walls?

A.—No protection is required when a ground wire passes through plain wooden walls. Through plaster, tile, metal or metal lath it is advisable to protect with rubber and friction tape or loom. This is to prevent accidental and high resistant grounds and to make the main ground more effective.

Q.—Why isn't the cut-off jack used instead of the cut-off relay on multiple type switchboards?

A.—The cut-off jack by which the insertion of a plug opens the cut-off springs and takes battery off the line was formerly used on multiple switchboards. This type of jack is, however, bulky and difficult to reach in clearing trouble and the wiring is excessive. Also the numerous series contacts on a large multiple switchboard would cause frequent trouble. These defects caused the development of the cut-off relay which has been found cheaper and better for the multiple switchboard. The cut-off jack is still an ideal arrangement for small non-multiple switchboards.

Q.—What type of form is considered best for use in the construction of concrete manholes?

A.—If only a small number are to be constructed it will probably prove more economical to build forms from a cheap grade of lumber. However, if a fairly large number are to be constructed it will probably prove desirable to make use of collapsible steel forms as they can be purchased at a reasonable cost and are certainly convenient to use.

Q.—What is meant by tip and ring side of a common battery line?

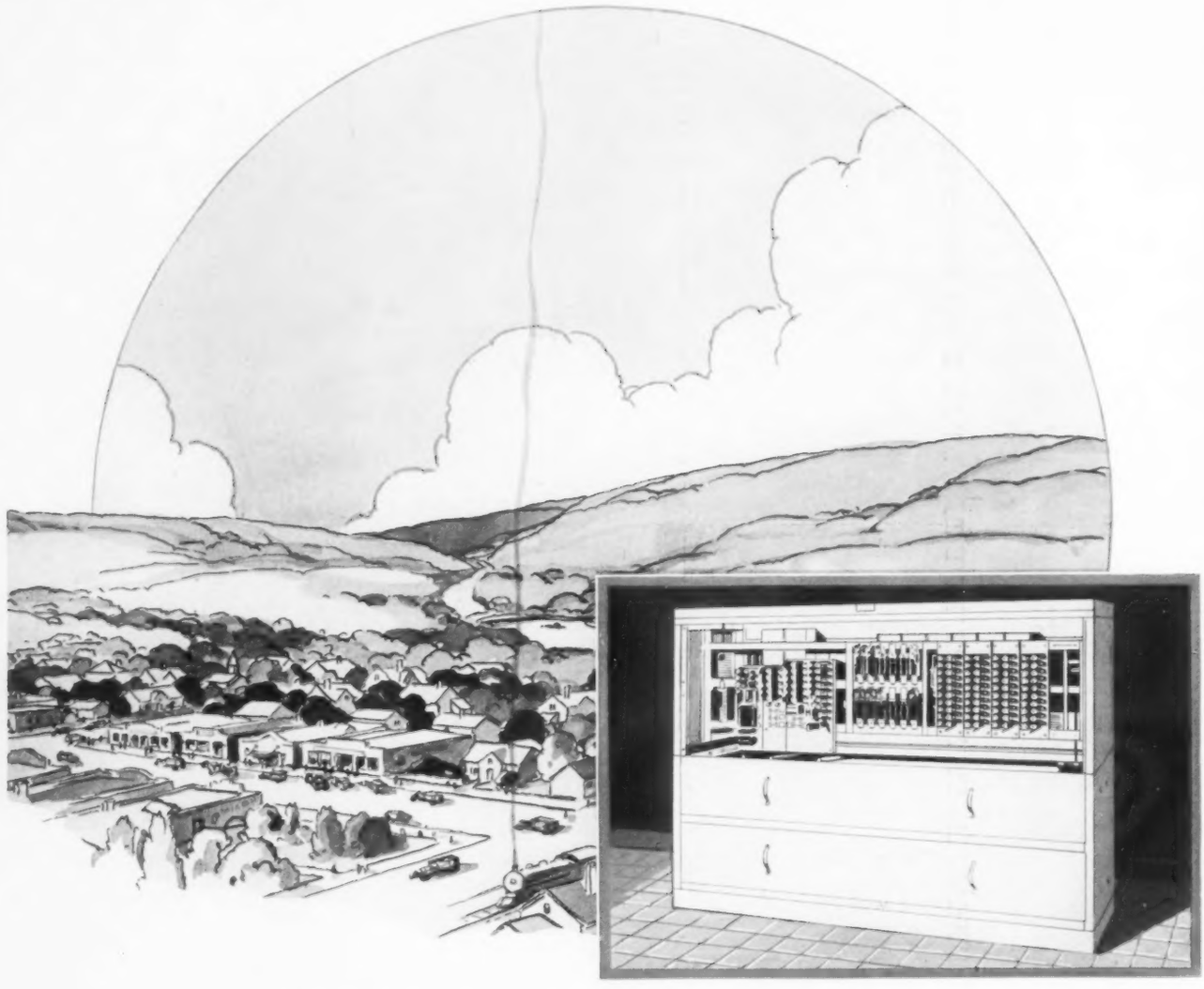
A.—Usually the "tip" is the ground side and is connected to the ground side of the central office battery. The "ring" is the battery side and is connected to the live side of the central office battery.

Q.—To what temperature should beeswax be heated for boiling-out silk and cotton insulated cables?

A.—Formerly beeswax was heated to a temperature of about 380 degrees F., but at the present time most everyone

(Please turn to page 35)

—AND THIS IS WY
REMOTE CONTL V



The illustration shows a typical, self-contained R-C-X switchboard—the cabinet housing all necessary equipment including ringing apparatus, batteries and battery charger. Dimensions: 78" (198 cm.) long, 24" (61 cm.) wide, 57" (145 cm.) high.

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AUTOMATIC ELECTRIC SALES COMPAN . . .

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WHY WE ADVOCATE TOLL WORKING TODAY

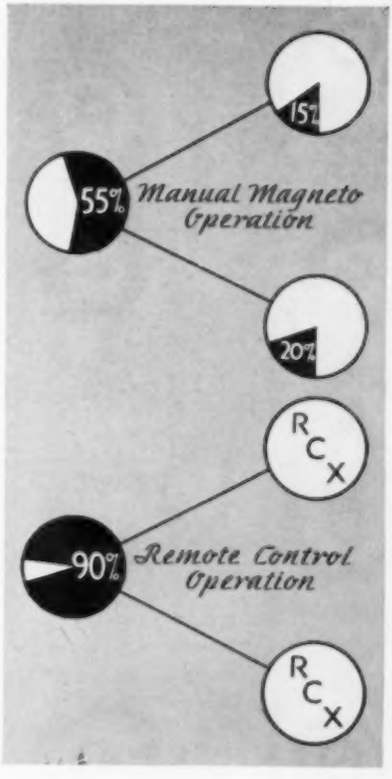
ay's conditions in the small exchange field are tough. Nobody hat any better than we do. That is why our engineers developed C-X.

r the R-C-X is the one type of equipment that will meet today's ritical need in small exchange operation—a need for some method ll eliminate traffic expense without requiring a big investment or ing of plant.

other method approaches Strowger R-C-X working in ability to hese conditions. Traffic studies show that the average small ge requires only one or two hours' operating time per day. Yet, e ordinary method, the full time of an operator is necessary. The uts an immediate stop to this practice of paying "full time wages" rt time work."

d the investment cost of R-C-X equipment need cause no concern. C-X were to be bought now, operated three or four years, and carded, it will not only have paid for itself, but will have earned rofit in the meantime. Not that anybody will want to do anyhe that, for the R-C-X switchboard will outlast any manual switchand subscribers appreciate the improved service it renders.

y not let us submit a study showing the increased earnings you ect with R-C-X operation. Send us the facts about your ex—today.



(Above) Diagram indicating the operator efficiency of toll center and two outlying exchanges. (Below) Same properties after the application of Strowger R-C-X.

OMA ELECTRIC SALES COMPANY
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ELECTRIC Y, S. A., 22, Rue de Verger, Antwerp, Belgium

UP-TO-DATE SERVICE FOR OHIO TOWN

By
E. F. WOODWARD
District Manager
Kellogg Switchboard and Supply Co.

Company and city officials gathered around the new switchboard to inspect its operation. Left to right: John Sheets, first telephone user; Guy Weaver, local manager; August Rettig, president, City Council; J. A. Kleinfelter, mayor. Leona Probst is at the board. Mildred Weithman, chief operator, is sitting in the foreground.

THE Northern Ohio Telephone company, Bellevue, O., has recently completed the installation of a Kellogg 6-800 Masterbuilt switchboard in its New Washington exchange. As a result, New Washington subscribers are now assured of quality telephone service with every modern feature. The board is equipped with universal lines which will enable the company to cut telephones over to common battery service at any time with a minimum expenditure of time and money.

The original telephone service in New Washington was a far cry from the fast, efficient service of today. It consisted of a public pay telephone installed in the store of Henry Becker and was used for long distance service only, since there was no exchange at that time.

In 1898, the village council passed an ordinance granting Frank Knapp and C. R. Callaghan premission to construct and maintain a telephone exchange. In 1902 this franchise was assigned to a new organization, the Local Telephone company and the first exchange was built. Sometime later—in 1927 to be exact—the Northern Ohio Telephone company was organized and included the former Local Telephone company as one of its units.

At the present time the Northern Ohio Telephone company operates exchanges in 41 towns and villages scattered throughout northern and central Ohio. Wm. C. Henry is secretary and general manager of the company and Frank Knapp, one of the men to whom the original franchise was issued, is president of the company. The Northern Ohio company's expansion has been consistent and rapid under its cable management and progressive policies.

Mr. Henry has plans that eventually will call for the conversion of the entire system to common battery service. His long experience in the telephone field has convinced him that this is the most logical step to take to assure his company a sound, prosperous future with sufficient subscribers and a fair and satisfactory rate.

As a part of the plan to convert all exchanges to common battery, the New Washington exchange was recently cut over to a Kellogg 6-800 Masterbuilt. Although common battery service is not yet in effect, the universal lines can be cut over from magneto whenever the company is ready.

Before selecting Masterbuilt equipment, the company spent considerable time investigating all other types of equipment. They realized that because of rapid advancement in telephone engineering, new features are being invented and incorporated in switchboards constantly. For this reason an ordinary switchboard may become obsolete in a comparatively few years unless it is designed with a definite purpose of meeting the future needs of the exchange wherein it is installed, regardless of traffic conditions or changes that might occur.

Wm. C. Henry of Bellevue, Ohio, secretary and general manager of Northern Ohio Telephone company.

The Masterbuilt swtichboard is specifically designed to do this. With it, New Washington subscribers will always have modern, dependable service and the telephone company will be able to give this service at the lowest cost, and at the same time it will not have money needlessly invested in idle equipment. If, at any time in the future, it is necessary to add another position, it can be done quickly and economically without service interruption.

In the following letter, written by Mr. Henry shortly after the installation of the new Masterbuilt board, he gives some of the other reasons for choosing this equipment and tells why it is so well adapted to the needs of his company:

"You are familiar with the fact that this company operates exchanges in forty-one cities and towns of northern Ohio. Twenty-three of these exchanges furnish magneto telephone service, serving six hundred subscribers or less. The biggest problem in these small semi-rural towns is that of increasing the number of subscribers and securing a compensatory rate for our service. It is thought that these two things can be best accomplished by giving to the small town and rural subscriber, up-to-date, full common battery harmonic telephone service.

"Some two months ago we had up for disposition the matter of new central office equipment at our New Washington exchange. In this plant we have three hundred and eighty subscribers, one hundred and sixty some on rural party lines, making traffic just one full operator's

Operator in position at the 6-800 Masterbuilt switchboard recently installed at the New Washington exchange.

load. Under the present economic conditions, it was not advisable to attempt to place in effect a higher common battery rate.

"To fit these requirements, we purchased one position of the 6-800 Masterbuilt switchboard. This equipment with its convertible circuits permits us to install a board which will operate with our present magneto telephones but which has all of the features required for conversion to full common battery harmonic service at a higher rate. Moreover, it was necessary to invest only a minimum amount of capital for present traffic requirements because the flexibility of the Masterbuilt line allows another position to be added at small additional expense and trouble."

The new central office equipment has one hundred and ninety lines installed, including individual and four-party local and twelve-party rural lines. All lines have lamp signal, supervision, and in addition, there is double lamp supervision on the full universal cord circutis. The board is completely equipped for machine harmonic ringing. By a slight change in the wiring of each line relay and the installation of common battery telephones, it can be adapted to full common battery service.

On one end of the board are two switches which are connected with the fire siren and police signal. The telephone company operates these switches whenever necessary, thus giving adequate fire and police protection to the town. The company provides this service free of charge.

New power, relay, protection, and battery equipment was installed in the terminal room. Just prior to the cutover to the new equipment, the quarters which house the exchange were completely redecorated and repainted. A topless customers' counted, new furniture, and venetian blinds give the office a trim, business-like appearance.

The New Washington switchboard is the third new manual board installed by this company during the same year, the other two being a six-position board at Medina and a one-position board at Wayne, O. Guy Weaver, a local manager at New Washington, extends an invitation to all telephone men to visit the newly equipped exchange if they are ever in the vicinity.

CARTER HEADS WELFARE COMMITTEE

The Communications Committee of the Commerce and Industry Division of the Citizens Family Welfare Committee is now fully organized and will be lead, as in past relief campaigns, by E. F. Carter, vice-president of the American Telephone and Telegraph company, it has been announced.

Mr. Carter is following the general organization plan which worked effectively in the campaign conducted for the Gibson Committee. Executives of the various companies are organized into a committee of nine. The other committee members are: J. F. Behan, American Telephone & Telegraph company; W. C. Bowen, International Telephone & Telegraph company; G. B. Thomas, Bell Telephone Laboratories; J. B. Harlow, Electrical Research Products company; C. G. Stoll, Western Electric company; T. P. Sylvan, New York Telephone company; C. H. Carroll, Western Union Telegraph company, and L. S. Crosby, Long Lines Dept., American Tel. & Tel. company.

TEXAS BULLETIN

Under the editorship of H. M. Stewart, newly appointed managing secretary, the Texas Telephone association has issued the first edition of its monthly bulletin. The bulletin, Texas Telephone Topics, is certainly interesting and will, we know, be helpful to Texas telephone men. We congratulate Mr. Stewart and the Texas association.

AN AD THAT DROVE HOME A POINT

The Hamilton County Telephone association, Aurora, Nebr., recently ran an advertisement in its local paper which brings home a vital telephone point to its public. The advertisement reads:

"If your neighbor borrows water from you, you pay for it.

"If you were to allow your neighbor to attach an extension light cord to one of your drops you would pay for the juice used.

"What about allowing your neighbor to use your Telephone? The subscriber eventually pays for this, too. How? Higher rates and call charges. The surest way to preserve the present low rates is to co-operate with the telephone company.

"The contract between the Telephone Company and the Subscriber states that you and your immediate family (meaning those living under your roof) and your employees are the only ones who have a right to use said Telephone. A STATE LAW upholds this contract and prohibits line tapping and use of your Telephone equipment by Non-Subscribers. We appeal to subscribers to curb this practice. You are also liable for all local calls placed over your phone by Non-Subscribers at .05c each and calls by either Subscribers or Non-Subscribers to other towns at the rate on file.

"The Telephone Code submitted by the United States Telephone Association to the President for his approval calls for higher wages, shorter hours and more help. This is our PATRIOTIC DUTY and this additional overhead must be met. It cannot be met if Subscribers permit Non-Subscribers to use their Phone. Nearly 95% of our revenue is from Telephone Rentals. We believe the Consumer's Code will apply to this practice of allowing free use of your Telephone."

At the bottom of the advertisement the following message was given in an "Extra Special Notice" box:

"We have been granted authority by the Nebraska State Railway Commission to waive all Service Connection Charges for two (2) months and during September and October we will install all Telephones (Main Stations and Extensions) free of charge."

LONG SERVICE RECORD

Home Telephone company, Humble, Texas, recently removed a pair of batteries after being in service seven years and eight days. The cells served four families and were manufactured by French Battery company.

GOOD ATTENDANCE AT N. C. CONVENTION

A GROUP of 100 telephone men attended the second annual convention of the North Carolina Independent Telephone Association, which was held in Concord, November 21 and 22.

President L. D. Densmore of Mt. Airy opened the initial session of the meeting by giving his address. He reviewed the work of the Association during the past year.

J. R. Porter, executive vice president of the Carolina Telephone and Telegraph company, Tarboro and vice president of the Association and chairman of its legislators and tax committee, reviewed the activities of the committee and gave the present status of taxes affecting the telephone industry.

Robbins Tilden, High Point, secretary, then read the minutes of past general and special meetings. John Morris, Roxboro, treasurer, reported there was a balance in the treasury after collections of dues and disbursements during the year.

The next speaker, B. L. Fisher, Martinsville, Va., outlined the value and purpose of the North Carolina Association. In his talk he emphasized the value of cooperation, good telephone service and public relations.

A letter from A. J. Maxwell, state commissioner of revenue, praising the service of North Carolina telephone companies, was read.

President F. B. MacKinnon of the United States Independent Telephone Association was unable to attend the meeting and Alfred L. Geiger, general attorney of the National Association discussed the telephone code and other important telephone matters in Mr. MacKinnon's absence.

Harry Dewey, Elizabeth City; L. B. Bryan, Durham; R. S. Du Rant, Silver City and Mr. Fisher led an informal discussion pertaining to accounting, traffic, engineering and commercial problems.

Following a recommendation of the nominating committee last year's officers were re-elected to serve this year. L. D. Coltrane, Jr., Concord, was elected a director for a three-year term. Wednesday morning was given over to a general discussion of various operating problems.

Stanley Winborne, member of the North Carolina State Corporation Commission, opened the afternoon session with a discussion of present economic conditions, emphasizing the importance of telephone companies rendering quality service at the lowest possible rates.

E. G. Padgett, state director of safety, gave safety statistics and urged the observance of the rules for the prevention of accidents.

Fred J. Turner, Carolina manager of the Southern Bell Telephone and Telegraph company spoke on the pleasant relations existing between the Independent companies and the Bell company and outlined some new business campaigns employed by his company.

The annual banquet at 7 p. m. was held in Hotel Concord. During the dinner music was furnished, after which short talks were given by Messrs. Densmore, Coltrane, Porter, Turner, Winborne, State Senator Luther Hartsell and prominent Concord citizens.

The Association voted Mr. Coltrane and the Concord Telephone company its thanks and appreciation for their hospitality.

NEW MANAGEMENT AT WARREN, OHIO

Ralph Mateer, Warren auditor who was named to the board of directors of the Warren (Ohio) Telephone company last July, took temporary charge of the system when R. R. McKinnis, who was receiver for more than two months, recently turned over the property at the order of Judge Griffith.

Announcement of definite policies are expected from the board of directors in the near future.

It will be the second time in less than six months that McKinnis has turned the property over to the company. In May he was named receiver in an action filed by the late N. A. Wolcott, which was upset by the Court of Appeals on the grounds that no notice has been given the utility of the appointment. At that time, C. D. Hershey was named temporary manager.

BUILDING LINE

A crew of 50 Sioux Indians are busy building a telephone line between Dupree, Thunder Butte and Cherry Creek stations. They expect to complete the lines in a few weeks.

BAD CHECK PASSERS USE PHONE BILLS

Use of a telephone bill for the purpose of identification to enable an unidentified woman to cash worthless checks, worked in Burlington, Ia., recently, has also developed in Cedar Rapids, Ia., according to Burlington police. In Cedar Rapids some twenty checks were issued by means of a phone company bill and a light bill. As worked in Burlington, a woman when asked for identification exhibited a paid telephone bill.

CODE'S HOURS, WAGES DISCUSSED

The committee which functioned for the United States Independent Telephone Association in connection with obtaining amendments to the President's Reemployment Agreement last August, has been continuing as a code committee in the discussions with the N.R.A. relative to a code for the telephone industry. This committee consists of: J. H. Agee, E. C. Blomeyer, J. P. Boylan, Geo. X. Cannon, W. C. Henry, Houck McHenry, Charles C. Deering, secretary, and F. B. MacKinnon, president.

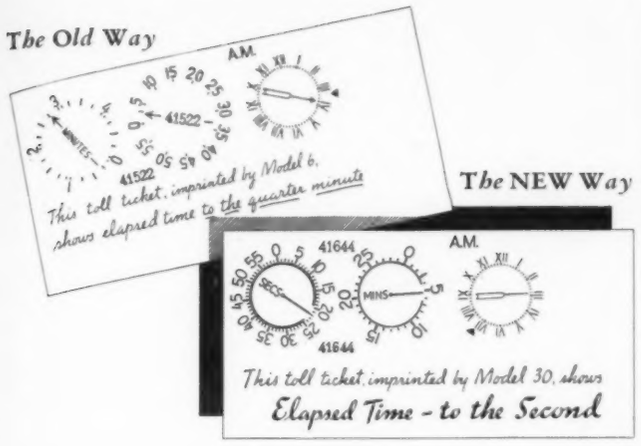
The committee is confronted with the desire of the N.R.A. that all telephone companies shall join in one code. The principal point of difference between the Bell code and the code submitted by the association in August, which is still on file and subject to discussion, is in the matter of hours and wages.

The codes are the same as to hour and wage schedules for Class 1, 2, 3 and 4 exchanges, but differ for Class 5 and 6 exchanges. The difference is that the Bell code stipulates a 40-hour week, while the association's code requires only a 48-hour week for Classes 5 and 6. Class 5 exchanges under the Bell code are subject to a $12.00 minimum wage, while the association's code specifies a 20 per cent increase in wages over those in effect July 1, 1933, but not to exceed $12.00. For Class 6 exchanges, the Bell code requires an increase of 20 per cent over the wage schedules in effect July 1, 1929, while the association's code requires a 10 per cent increase over the wages in effect July 1, 1933. Both codes provide that Class 6 exchanges shall not be required to pay over $12.00 a week; and both codes provide that in exchanges where not more than two operators are on duty at any one time there shall be no hour restrictions.

The committee takes the stand that the Independent companies in Classes 5 and 6 cannot go under the Bell wage and hour schedules, and that the association's schedules should prevail for Independent companies. The committee also is asking that all exchanges in towns of less than 2500 population shall be entirely exempt from code requirements, both as to wages and hours.

LAYS CABLE

The Iowa State Telephone company is laying 3000 pounds of cable to replace overhead wires that have been causing them a lot of trouble in Grundy Center.



How the NEW CALCULAGRAPH

PRINTS ELAPSED TIME TO THE SECOND

As everybody in the telephone world knows, the Model 6 Calculagraph prints toll call elapsed time to the quarter of a minute.

Now, to cut still further the overtime allowances on toll messages, the new Model 30 Calculagraph **prints elapsed time to the second.**

This new model is equipped with a self-starting synchronous motor for 60 cycle, and either 25 or 110 volts regulated, alternating current. The mechanism is so designed that it can be fitted to the Model 6 spring-driven Calculagraph at a reasonable cost.

Sample imprints sent anywhere in the world on request. Please state the serial numbers of Calculagraphs now in use in your exchange, and estimates for converting them to the Model 30 will be provided.

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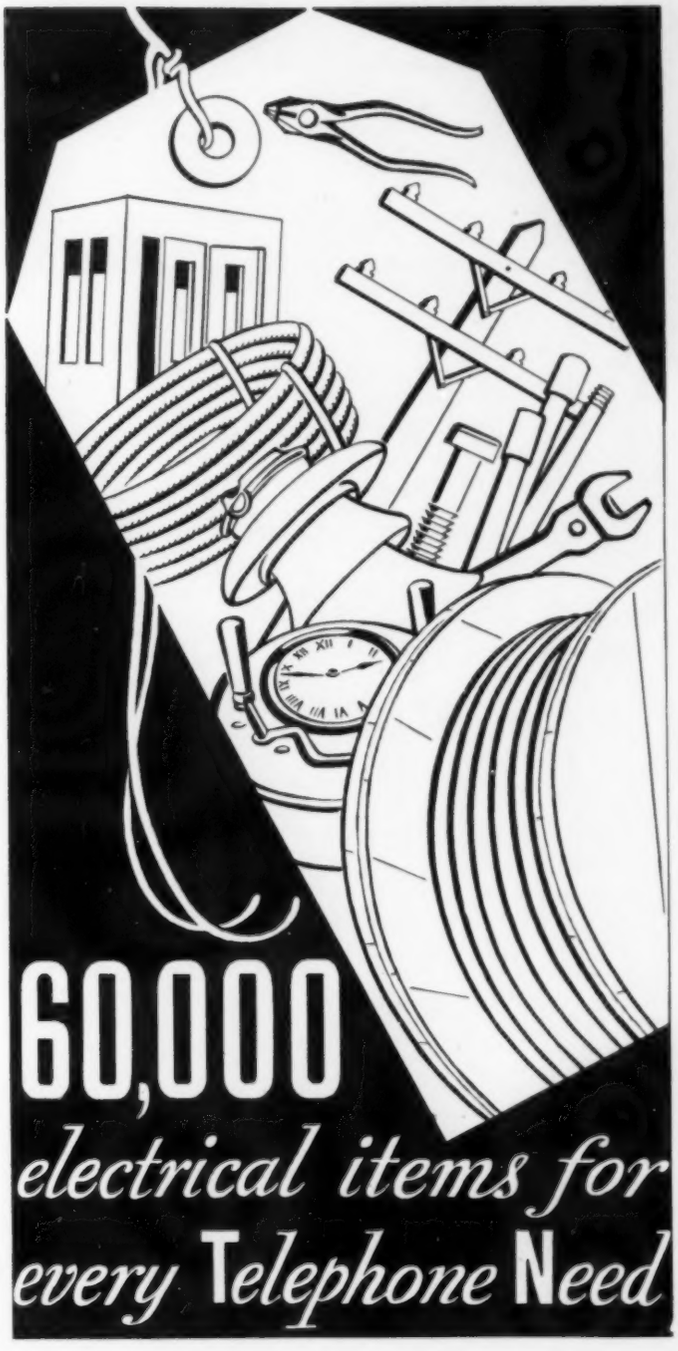
CALCULAGRAPH
THE ELAPSED TIME RECORDER



In these days when everyone is looking for purchasing economies, Graybar's service of supplies makes economies possible . . . It brings 60,000 electrical items within arm's reach of the telephone user. Does away with "shopping" around. Eliminates expensive stocks . . . The natural result of Graybar's long experience in meeting the special needs of the telephone industry—an experience that goes back to the beginnings of that industry in America.

Graybar

Offices in 73 Principal Cities. Executive Offices: Graybar Bldg., N. Y.

NEWS FROM THE FIELD

Construction of a new telephone and electric power line in Spearfish, S. D., has been started jointly by the Consolidated Light and Power company and Northwestern Bell Telephone company. New and higher poles are being put in, which will carry the wires of both utilities.

By using one pole for both companies, the number of poles in the city will be lessened.

The building of new lines from the Pluma plant between Deadwood and Lead, to Sturgis and to Redwater below Spearfish has furnished work for a large number of men in addition to those regularly employed.

Returning its capital stock schedule at what was considered its value caused an assessment against the Deer Creek (Ill.) Telephone company on that valuation and led to filing of a suit entitled Deer Creek Telephone company vs. Jacob Haning, county treasurer and ex-officio collector of taxes of Deer Creek township, to abate tax and for relief. The matter was adjusted by Judge Henry J. Ingram by granting the company an abatement in its tax from $200 to $34, the amount for state, county and highway taxes.

Roy Schwalm of ElDorado Springs, Mo., who recently purchased the Hume (Mo.) Telephone exchange, has also purchased the Metz exchange. Both exchanges had been owned by the Citizens Public company of Missouri.

The ownership of the Galva (Kans.) telephone exchange changed hands recently. U. B. McGuire, former owner and manager, acquired property at St. John, Kans., and will move with his family to that city within a short time. Miles Baldwin has taken over the exchange at Galva.

The Kansas Telephone company has applied to the state corporation commission for authority to remove its exchange from Welda to Westphalia. The Lone Elm exchange recently was consolidated with the Kincaid central office.

Laying of a large conduit, to place all telephone lines between Robinson and Olie avenues on Northwest Twenty-third street underground, at Oklahoma City, Okla., will be started soon by the Southwestern Bell Telephone company, L. M. Bush, city engineer, said. The work will cost $75,000.

Workmen have begun removing wires and poles of the Southwestern Bell Telephone company, on North and South Division sts., Guthrie, Okla.

Three underground cables carrying a net work of 5,596 individual wires practically eliminates the danger of line trouble, according to A. J. Jude Smith, wire chief.

The cables were laid several months ago. Total cost of the project was around $46,000, Smith said.

The employees of the Iowa Union Telephone company at Emmetsburg, in company with a number of the employees of other exchanges in Iowa and Minnesota, met recently and arranged a program which gives each employee an opportunity to sell telephone service to new subscribers and reconnect former subscribers who were temporarily disconnected due to the economic conditions. Those who have enjoyed the convenience of having their neighbors and their marketing centers within speaking distance have doubtless felt lost without their phone and it is quite probable that the efforts of the employees will result in the addition of a considerable number of new subscribers for the courteous and always ready service the exchange furnishes.

Installations of the Anderson office of the Indiana Bell Telephone company have gained during the past two months In October, 1932, there were 49 disconnections. During September and October a gain of 130 installations was reported by the telephone office.

Mrs. L. Gahm holds three positions with the Rolfe (Ia.) Mutual Telephone company. She is manager, operator and collector in rural districts.

The Fidelity Telephone company with exchanges at Bland, Sullivan, New Haven and Owensville, Mo., have just completed rebuilding programs in its New Haven and Sullivan exchanges. At the former the entire central office was remodeled and all the main cables from the office out were placed underground for an average of one-half mile in each direction. All aerial cable wire and poles were removed. The work of pulling slack, resetting or replacing poles is being continued by M. Hilton, manager.

At Sullivan the central office was redecorated. All cables for an average of one-quarter of a mile out in each direction were placed underground. The work at New Haven and Sullivan was under the supervision of John J. Cline, district manager, who is continuing the work of pulling slack and other needed repairs to place the plants in excellent condition for winter.

All three of these exchanges are showing net gains in stations and conditions seem to be improving all along the line.

An active new business campaign under the supervision of General Manager T. L. Leonard is being conducted by the Ozark Central Telephone company at all of its exchanges in Missouri. Excellent gains are being reported by the exchanges and a general tone of optimism prevails.

The Cuming County Independent Telephone company with offices at Wisner, Neb., is solving a telephone situation blamed to "Old Man Depression," which has forced many rural patrons to discontinue the use of the telephone.

The company has built a corn crib with a 750-bushel capacity, and is taking corn in payment of bills past due. Many farmers are taking advantage of this mode of payment and are reinstating their telephones.

Already 800 bushels of corn have been acquired and the company is finding it necessary to build a second crib. The company is doing its own hauling with a trailer and is paying 40 cents a bushel.

Work on the complete renovation of the New Bloomfield, Pa., exchange of The Perry County Telephone and Telegraph company was begun recently.

The improvements as announced by R. J. Makibbin, district manager, include a new switchboard with associated equipment, a section of cable, remodeling and painting of the front of the building, redecorating and papering of the interior, laying of a new floor, installation of a large, modern telephone booth and counter, and complete rewiring of the office.

Officials of the Chesapeake & Potomac Telephone company are working on a new rate schedule which is designed, if accepted, to save telephone users in Maryland about $1,200,000 a year. The Public Service Commission had ordered a general reduction in rates. Harold E. West, its chairman, said specific changes would be left to the company.

COOK CABLE TERMINALS

for AERIAL—UNDERGROUND and GAS FILLED CABLE

PROTECTED, UNPROTECTED OR CROSS CONNECTING

30 years of experience in designing and building equipment for terminating, distributing and protecting lead covered telephone cable is at your disposal.

COOK ELECTRIC COMPANY

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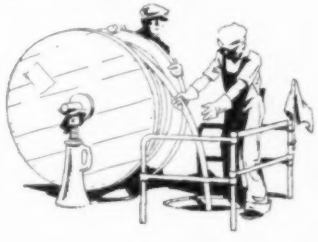

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Hemingray Glass—designed to improve every angle of insulator service—soon demonstrates its many advantages in ease of installation, economical maintenance, long life and moderate cost. It is homogeneous in character, having but one coefficient of expansion. It is clear and flawless to permit easy inspection—does not age or deteriorate—has high dielectric strength.

All-around ruggedness enables Hemingray Insulators to resist rough handling and adverse weather conditions. Heat shock tests eliminate all units unable to withstand sudden violent temperature change. Heavier side walls, thicker petticoats give additional reinforcement.

It will pay you to investigate the superiority of Hemingray Insulator Service. Write today for free samples and descriptive bulletin.

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Public utilities are front page news items. They are being assailed in the Halls of Congress, in Committees, and by politicians.

The more true fundamentals of the business your employes know, the better able they will be to combat erroneous ideas in the public mind.

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Already used and recommended by a number of Bell and Independent companies.

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ICE, SLEET .... miles of line down .... Wire stocks inadequate .... Rush shipments imperative .... Then, look to Jobbers of *Crapo* Galvanized Wire and Strand!

You can depend upon them in every emergency .... and, they in turn, can depend upon us .... for, they know from long experience, that RUSH orders received by us in the morning are shipped before night!

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RAMBLINGS

By J. A. S.

During the latter part of November, Rambler visited in a number of Southern states, gathering as much information as possible regarding conditions in that section. We left Fort Worth as the emergency relief program was getting under way and found men working in cities, towns and along the highway during the balance of our journey.

* * *

In Waco, Texas, we had an interesting visit with H. M. Stewart, new managing secretary of the Texas Telephone Association. He is busy arranging for an active year's work for the association. As soon as matters can be conveniently arranged his office will be removed to Austin and he will operate from that point in the future.

* * *

While in Waco we also had the pleasure of visiting at the L. S. Gardner home and renewing friendships with Lyman and Mrs. Gardner. After years of active work Gardner is taking an extended rest.

* * *

Down at Austin, Texas, we had an extended and interesting visit with our old friend J. E. Farnsworth, former vice president of the Southwestern Bell Telephone company with headquarters at Dallas. "Uncle Joe" was retired a few years ago and is now making his home in Los Angeles. Rambler owes much to his friendship with Mr. Farnsworth, whom he feels has done more to bring harmony between Independents and Bell companies than any other man in the Southwest.

* * *

Our good friend Merton Swift of the San Marcos Telephone company felt sufficiently interested to meet the writer in Austin, for which we wish to express our gratitude. Mr. Swift was a real friend when Rambler published TRANSMITTER at Fort Worth, and is still a friend. Like a majority of others we met on our trip, Mr. Swift reported improvement in station gains during the last few months.

* * *

We understand that John Stratton, former Texas representative of the Kellogg Switchboard & Supply company, is well satisfied as manager of the Springhill Telephone company at Springhill, La. Stratton spent many years as salesman and is one of the best engineers in the telephone business. His many friends will be interested to know where Mr. Stratton is now located.

* * *

Through the gulf coast country we found opposition to the president's plan of employment. We were informed that relief employees are being paid a greater wage than that provided in codes for labor in that section. It was pointed out that house rent and fuel is almost insignificant in the timbered sections of the South and that therefore practically the entire amount paid emergency relief workers could be used for food and clothes, whereas in the northern states a large portion was necessary for rent and fuel.

* * *

It was recounted that where emergency workers were paid a higher wage than regular employees it had a tendency to cause dissatisfaction among laborers, and in some instances they were giving up permanent jobs to take the temporary work at higher pay. One employer stated that he was thinking of closing his business and joining the pick and shovel brigade.

* * *

In Mobile it was a genuine pleasure to visit with W. H. Bryant, well known Independent telephone man of Alabama and a member of the board of directors of the National association at this time. Mr. Bryant invited Rambler and his family to visit his orange grove near Mobile and his invitation was accepted forthwith. The trip was a most interesting one as Mr. Bryant has a wonderful farm on one of the larger rivers emptying into Mobile bay.

* * *

Here is a placard we saw somewhere on our rounds and it so impressed us that we are passing it along:

When You Wake Up Get Up.

When You Get Up Wake Up

We think it is worth thinking about. Suppose you think it over.

All along the line we were told that conditions seemed to be improving and that the emergency relief employment would go a long way toward helping cities and towns. In almost every place visited we were told that gains were being made by telephone companies in installations and expressions were heard that next year was expected to witness greater activities in the matter of construction work.

* * *

Our old time friend H. W. Birtch, formerly with the Gary interests in the operation of the telephone properties, but for ten years with the Southwestern Bell at Fort Worth, gave us an invitation to visit him and we enjoyed a visit from this scion of the south. He made us feel good by telling us how he and his coworkers read TELEPHONE ENGINEER each month and emphasized his words by having his pal at the next desk present us with a subscription for the coming year.

* * *

While in Atlanta, Ga., we visited with W. C. Meredith who makes the best wood conduit to be found (at least that is what he says and we have found him to be strictly sincere in his statements and honest in all things), so we are inclined to give his words as much weight as the wood in his product at least. As usual we had an interesting and profitable visit with him.

BELL MAKES CHANGES IN PENNSYLVANIA

Announcement has been made by Philip C. Staples, president of the Bell Telephone company of Pennsylvania, that for purposes of increased operating efficiency its Philadelphia and Eastern areas will be consolidated into a single area to be known as the Eastern area, effective December 1. Lehigh, Northampton and Carbon counties and the portion of Luzerne county around Hazleton have been transferred from the former Eastern area and will be operated from the Central Pennsylvania area with headquarters in Harrisburg.

The following will be in charge of the new Eastern area which includes Philadelphia and the surrounding territory in Pennsylvania, together with the Diamond State (Delaware) Telephone company: vice-president and general manager, H. L. Badger; general commercial manager, T. H. Griest; chief engineer, J. E. Murdoch; general plant manager, H. B. Porter, and general traffic manager, H. L. Fitch.

Edward M. Prisk, formerly in charge of the Eastern area, has been appointed assistant to President Staples.

"A Good Name Is Better Than Bags Of Gold".--Cervantes.

TELEPHONE ENGINEER has gained its notably good name in the telephone industry through 25 years of unswerving adherence to publishing ideals as stern as those of any profession.

Since its beginning, TELEPHONE ENGINEER has been devoted exclusively to the service and to the best interests of men responsible for the generation, transmission, distribution and utilization of telephone service.

Through prosperous periods and lean ones alike, TELEPHONE ENGINEER'S editorial quality and influence have continuously been upheld and improved, as letters from hundreds of readers and advertisers testify.

At no time have efforts been made to attract subscribers of doubtful value. Subscriptions are sold solely on the basis of its practical value to the subscribers.

As a result of this sound, unforced circulation policy, TELEPHONE ENGINEER today delivers to its advertisers a large, substantial audience in the telephone field.

The facilities and service of TELEPHONE ENGINEER have always been at the call of all advertisers alike. No one advertiser has been favored. No one advertiser or group of advertisers have influenced the policies or opinions of TELEPHONE ENGINEER at any time. Nor will they in the future.

Advertising rates in TELEPHONE ENGINEER have always been attractively low because it is published by a compact organization, concentrating its entire energy on this one publication. Consequently, TELEPHONE ENGINEER offers a low page rate for industry coverage. It has been maintained a monthly publication because in a monthly, reading material can be cleansed of all superfluities and "chaff," giving subscribers the best reading material. And—in a monthly advertisers can cover in unit form, every phase of the telephone industry economically and effectively.

Unyielding adherence to these straight-forward publishing policies has won to TELEPHONE ENGINEER many loyal friends during its 25 years of service to the telephone industry. It has brought TELEPHONE ENGINEER a priceless business asset with which the future is faced with confidence—a good name.

This good name also is a valuable advertising asset to manufacturers supplying the telephone industry.

TELEPHONE ENGINEER

185 NORTH WABASH AVE. CHICAGO, ILL.

Something to Think About

By R. C. RENO

B. C. FORBES, well known syndicate financial writer, recently gave us all something to think about in this day of doubt and uncertainty. Without any introductory remarks I will quote the following portion of his column which struck home a vital point to this writer:

"President Roosevelt has one quality, one characteristic, one possession which is priceless: Optimism, cheerfulness, faith.

"Never once has he exhibited (publicly) the slightest doubt in his ability, in the nation's ability, to lick depression and restore prosperity.

"A pessimistic president would be a calamity these days. We need the chief executive who knows how to smile, who has inexhaustible self reliance, who has unshakable confidence in America's ability to triumph.

"If every business had at its head today an executive of similar unconquerable determination to overcome all obstacles, we would have made faster progress.

Liquid Sunshine

"I once visited Hawaii. While playing golf with the governor rain began to fall. Being a Scot, it didn't bother me, but I suggested to his excellency that perhaps he might want to quit. 'Why?' he asked. 'The rain,' I explaned.

" 'My dear sir,' he replied, 'in Hawaii we regard and call rain "liquid sunshine. Look—'

"He pointed toward the surrounding mountainsides, and lo, I saw something I had never before seen, namely, three distinct rainbows.

"Somehow, Franklin D. Roosevelt's irrepressible cheerfulness reminds me of that incident and that scene. He never exhibits the slightest shadow of doubt that the sun will again shine and that all will be well with America.

" 'Tis said that every organization is but the lengthened shadow of one man. Do you not agree that it is incalculably important that the head of our nation is a man who radiates inspiration, faith, invulnerable confidence?

"If he, with all the problems and difficulties pressing upon him, can consistently exhibit courage, surely it ill becomes the rest of us to wilt, to show the white feather, to give up. . . .

This Changing World

"It was remarked in this column the other day that, while many elderly men of the old school type are pessimistic and cannot see their way out of what they call the present all pervading 'fog' the majority of younger executives are full of vim, vigor and vision.

"At a private dinner attended by leading Baltimore citizens, the host, A. B. Chivers of the Baltimore News, asked the mayor and others to make little talks which might be illuminating to this writer. One department store owner related that he had recently taken his son into the business, and added: 'I am trying to understand him.'

"Instead of laying down the law to the young man as to how everything must be done, instead of ordering his son to accept unquestioningly his ideas, this business man in encouraging the youth to thank for himself, to suggest innovations, to express his own mentality and personality. Already the parent is inclined to believe that this method will yield worthwhile results. The son is giving evidence that he is en rapport with the new day, the new era.

"Does it not behoove us all to adapt ourselves to this changed, changing world?"

The other day this writer, a young man in years and business experience, visited a well-known executive. Upon entering this man's office I was flowing over with confidence and faith. Not only in the President, but in the ability and "intestinal fortitude" of the American public to come back to its own—in the ability of our leaders to build a better and more secure world in which to live.

It wasn't the type of confidence that assured me that I was going to get an order from this executive, but it was the kind that gives young men the impedus to go forward, to learn and to work. Frankly, and I am sorry to admit it, when I came out of his office I was more or less "whipped" because of his declared pessimism and gloomy outlook for the future. And—it took two or three days to regain that confidence and faith that was shaken during the interview.

The point in question is whether or not it would not have been better for me and for this executive if he had displayed confidence and optimism in the future of American business and life to come back. This is just something for business executives of this country to think about.

SHOW THIS TO YOUR LOCAL GROCER

A recent issue of the National Grocers Bulletin points out that in many cases, about sixty to seventy-five per cent of the retail grocers business comes over the telephone.

"The American public," continues the Bulletin, "has accepted the telephone to such an extent that its use has become almost second nature. When something is wanted in a hurry, most people turn instinctively to the telephone, and this is a tremendous help to the merchant who is interested in increasing the volume of his business by building up telephone trade.

"His task is not that of pioneering in an unknown field; it is largely a matter of encouraging or stimulating a tendency that already exists. Neither does he have to teach the public how to use the telephone; he only has to develop and extend the use the public is already making of it.

"The fact that nearly every store receives unsolicited orders by telephone shows in itself that here is a real public demand and desire to use the telephone for shopping purposes. The small retail merchant may capitalize this demand to his own profit and at the same time render a valuable service that the public really wants.

TELEPHONE NECESSITY

"The telephone was instrumental in saving my husband's life," said a woman recently in the Loyalist office. Had it not been for the fact that this man was able to step to the telephone and call a neighbor who quickly got him to the doctor, he might easily have bled to death from a cut which severed an artery in the wrist.

The Loyalist is not drumming up business for the telephone company but, two cases of this kind, coming to our notice recently, have raised the doubt in our mind that economizing by way of having a telephone taken out, isn't real good economy in the end. Perhaps some other means of saving might be found, so that the telephone service need not be discontinued.

—North Loup Neb., Loyalist.

ADDS 30 TELEPHONES

A. L. Kelley, manager of the Farmers Mutual Telephone company office at Clarinda, Ia., reports the company added 30 patrons in November. The patrons' list now is as long as it was in January this year, he said.

YOUR Employees NEED A LIBRARY

All the Latest Telephone Books at Lowest Publishers' Prices

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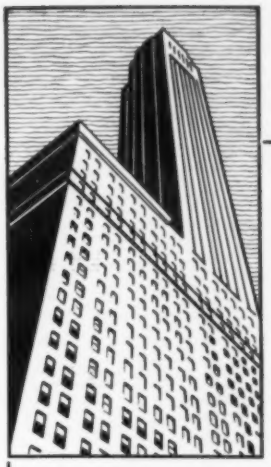

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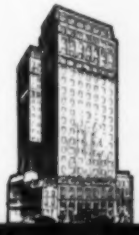

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NEWS OF FOREIGN COUNTRIES

NEW LINES

The Feng-Shan Railway, China, has let out contracts to the extent of Mex. $180,000 (about $40,000) for the repair and construction of telegraph and telephone lines between Mukden and Shanhaikwan. It is planned to replace 25,000 poles and make necessary repairs to all existing lines. In addition, new long distance telephone wires will be installed between Chinchow and Shanghaikwan which will greatly facilitate the long distance service between Mukden and Shanhaikwan, as at the present time there is only direct service between Mukden and Chinchow.

The work has been divided into five sections, four of which will be done by Japanese contractors and the fifth section from Shanhaikwan to Suichung, a distance of 65 kilometers, will be constructed by the railway itself. All of the materials will be purchased and supplied by the Stores Division of the railway. It is reported that this work was planned by a Japanese adviser and Japanese materials will be used as far as possible.

JAMAICA PHONE RETURNS

There were 272 post offices in Jamaica at the end of 1932. A total of 17,218,000 pieces of mail were handled, compared with 17,675,000 in 1931. Gross postal receipts amounted to £86,686, as compared with £91,806 in 1931. Internal telegrams numbered 305,102 as compared with 327,339 the previous year. Inland telegraph receipts amounted to £18,344 in 1932 as against £18,000 in 1931. It is estimated that about 480,000 cables were sent in 1931 and 1932. The Jamaica Telephone Company, Ltd., the only public telephone company in Jamaica, states that its total receipts in 1932 amounted to £23,600 as compared with £22,686 in 1931. The company has 10 miles of underground line and 40 miles of underground cable. It has 53 miles of pole line, 460 miles of wire, 2,255 subscribers and 3,064 stations.

EXCHANGES PLANNED

The Post and Telegraph Department is considering the installation of automatic telephone exchanges in Bangkok to replace the present manual boards.

TELEPHONES IN THE WORLD

The year 1931 was the first in which the telephone development received a setback, the total number of stations receding from 35,343,000 in 1930 to approximately 35,169,000, a loss of about 174,000 stations. The earliest returns showing a loss of half a million telephones in the United States and 90,000 in Germany, foreshadowed a much heavier total decline, but the fairly steady progress made in most European countries has reduced the loss to the figure above mentioned. Statistics have not yet been received from Japan, and the present economic position of the world no allowance has been made in the estimated total for an increase in that Empire.

The total is distributed as follows:

	1930	1931
Europe	10,532,000	10,926,000
Asia	1,413,000	1,408,000
Africa	238,000	244,500
No. America	21,836,000	21,281,000
So. America	620,000	633,000
Australasia, &c.	704,000	676,500
Total	35,343,000	35,169,000

SHIP-SHORE TELEPHONY

Amalgamated Wireless Asia, Ltd., recently carried out the first two-way wireless telephone conversations between an Australian ship and a shore station. The S. S. "Katoomba" was equipped by the company with short wave telegraph-telephone equipment especially designed and manufactured by the company's Sydney plant. The telephone conversations were transmitted to the ship from Pennant Hills, a suburb of Sydney, and were received at the company's high-power receiving station at La Perouse, another suburb.

INCREASE IN PHONES

Despite the depression which still overshadows the world and retards all industrial progress, it is gratifying to note that, according to Post Office statistics just issued, the number of subscribers connected to the public telephone system of the British Post Office has increased during the past year by upward of 65,000, states the chairman of Siemens Bros. It is greatly to the credit of the publicity campaign of the Post Office that this result has been achieved, while other countries have been showing a decrease in the number of their telephones. With Great Britain still holding tenth position as far as telephone density in respect of population, there is still a wide field for popularizing the telephone and bringing this country more nearly to its rightful position among the great telephone using countries of the world. With the continued success of the Post Office publicity campaign we may look hopefully to the future in this branch of our business.

ALGERIA TO FRANCE

Radio-telephone service was opened between Algeria and France on June 6, 1933. Conversations during the first four days numbered 130 and totaled 571 minutes. The transmitter in Algeria is situated at Eucalyptus and the receiving station is located at Boufarik. The cost of the installations, including buildings and land, amounts to approximately 13,000,000 francs (about $510,000 at part rate of 25.52 francs to the dollar).

ENGLAND SHOWS SURPLUS

A provisional financial statement on the Post Office commercial accounts shows that during the year 1932-33 (fiscal year ended March 31, 1933) the deficit on the telegraph service reached £876,000, an increase of £66,426. The surplus on the telephone service amounted to £562,000, which is £9,848 less than in 1931-32.

NEW SERVICE OPENED

Telephone service between Rome and Manila, Philippine Islands, was inaugurated on June 19.

NETHERLAND INDIA

A radio telephone connection between Java and Madoera and the port of Makassar in Celebes was opened early in July by the Netherland Indian Postal, Telephone and Telegraph Administration. An overland long-distance telephone service between Palembang and Benkoelen, two cities in South Sumatra, will be opened June 30. In Java and Madoera the connection may be established through any telephone connection and the public telephone booths, whereas at Makassar a special booth at the telephone office may be used.

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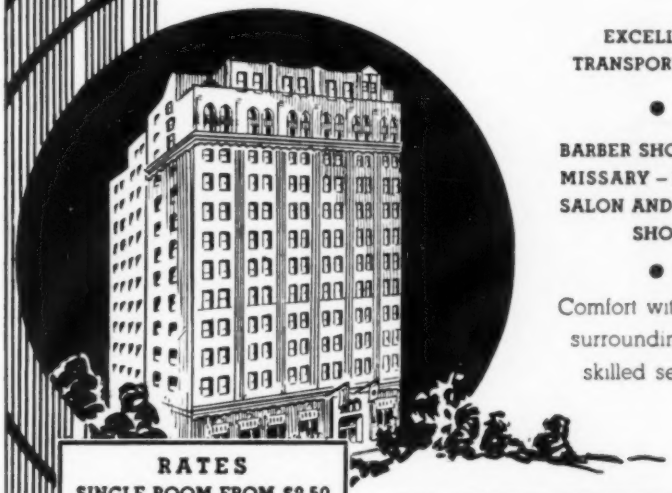

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"GUESS FACTORS" IN MAINTENANCE

(*Continued from page* 13)

Because the test pad assists in localizing faults, many cases of trouble will be exposed by this method of testing that might otherwise be overlooked. One of the most important elements of telephone service is telephone transmission. In order to be sure that the subscriber receives what he pays for, it is necessary to measure transmission. The testing arrangement under discussion gives a definite "yardstick" with which to measure transmission performance.

This testing practice reduces the "guess factor" in maintenance work and is an essential activity in all carefully planned maintenance aimed at a close economic control of maintenance practices. For these reasons this general method of testing is recommended for use in all central offices, regardless of type or size.

Quality or naturalness of transmission should also be carefully watched when making these tests. One of the most desirable requirements of an operator is that she possess the ability to convey the impression to the customer by an alert, business-like tone of voice, that she is not only interested in her work, but that she is especially interested in handling his particular call satisfactorily. Therefore, when a transmitter is found that excessively distorts makes unreal the operator's voice, that transmitter should be immediately removed from plant and a new one installed.

Have It Checked

Sometimes the old transmitter can be improved by sending it through a reliable "transmission recovery" process of a recognized factory.

The removal of substandard operator's transmitters and receivers and the installation of efficient apparatus in their places will result in a number of improvements, among the more desirable of which usually are: (1) the energy of the operators is conserved; (2) voice strain is prevented; (3) errors are reduced; (4) there are fewer repetitions of orders and phrases; (5) operating work is made easier and more pleasant; (6) tension is reduced in the operating room; (7) customers are better natured; (8) the work of the operators is better; and last but not least, (9) better service is furnished to our patrons.

While the maintenance of the operators' telephone set has been stressed in this discussion, there are many other items of equipment which are equally vital to the service as a whole. It will readily be appreciated that similar maintenance routines can be worked out and applied to other portions of the plant which will result in finding and clearing troubles *before* they become serious enough to be detected by the operator or the customer.

What A Good Foreman Should Be

A foreman is the leader of his crew in all things that pertain to the building of his immediate job, his future jobs and his company, and should be a man capable of working more men than one. Always level-headed, never losing his temper under any circumstances, and should understand each job before he undertakes to do it, and to be sure that he has taken all caution in regard to every form of safety. He is solely responsible for anything that happens on his job. He should be a man that is always in touch with his men, explaining each and every job to the man or men that he has assigned to do this work, and to be sure that the man or men undertaking the work understand thoroughly the nature and danger of the work before going into it.

The foreman is the man who is closest to the public in regard to things pertaining to the work the company is doing. He is the one who should settle all disputes arising out of minor grievances. He is the one who should have the interest of the men whom he is working always at heart, and should never show partiality to any one man, always being square and honest to them in all things. He should never take personal affairs on the job.

The foreman should see that all of his tools are safe and the linemen's tools are safe; he should never let a man climb or work with tools unsafe.

A foreman should never exceed his authority in regard to matters arising such as trimming trees, guy rights, private right of way, and things of this nature.

And last, but not least, a foreman is the man to see that all safety devices and ALL company rules are carried out to their fullest extent.—*A. B. Merill, Foreman, Transmission Line Department, Dixie Construction Company. Won first prize in Dixie contest.*

ELDORA GAINS

More new telephones were added during October in Eldora, Ia., by the Central Iowa Telephone company, according to Manager Glen Carson. More than fifty phones have been added during the past two months.

WHY IS A TELEPHONE CABLE FAILURE

(*Continued from page* 18)

tive potentials on the cable sheath. Insulation tests are also made periodically on all cables, and on certain important toll cables this testing is continuous.

Studies indicate that approximately 45 per cent of all aerial cable troubles are within five feet of the pole. For this reason, all employees who climb poles now make a careful inspection of the sheath, so that preventive measures may immediately be taken wherever a sheath defect is detected.

Another practice, which may not be considered preventive in the strict sense of the word, does however prevent a considerable number of large cable failures. This is to "locate" on all one or two-pair failures, on which the former practice was merely to change pairs. Actual inspections at these locations show that in over 70 per cent of the cases the damage to the sheath is such that a cable failure of sizable proportions was imminent. "Cable failures," therefore, are continually on the decline.—*The Transmitter.*

BELL STATION GAIN CONTINUES

The Bell system conversion of losses of stations into gains—which resulted in a net increase of 53,000 telephones in September — continued during October. While the October figure was substantially lower than that for September, the system as a whole has nevertheless been able to show a gain.

October's inability to show a gain comparable with the previous month is tempered somewhat by the fact that September is normally one of the best months of the year from the viewpoint of new business. Installation of telephones in homes at the close of the vacation season is an important contributing factor.

After more than two years of continuous losses, the Bell system slid into a net gain some time during September, the 53,000 station gain for the month comparing with a loss of some 85,000 stations in September, 1932. September, 1933, showed the largest gain of any month since November, 1929. Previous month that a gain was shown was in September, 1931.

$55,145 EXCHANGE

A permit has been issued to the Illinois Bell Telephone company for the construction of a telephone exchange, costing $55,145, at 2215 South Wabash avenue.

LINE & DESK: QUESTIONS AND ANSWERS

(*Continued from page* 19)

agrees that a temperature of about 285 degrees F. is a safe and satisfactory temperature.

Q.—When is the use of insulated screw eyes recommended?

A.—They are generally used and considered better than the ordinary type, to support drop wires on wooden or stucco buildings.

Q.—Is it considered necessary to clean a pipe before installing a modern ground clamp?

A.—The modern ground clamp if properly installed would probably make contact even on a dirty pipe but it is always good practice to clean a pipe thoroughly before installing the clamp. A very dirty pipe should be thoroughly scraped with a file and then cleaned with sand paper or emery paper. Usually a file is not needed on galvanized pipe as cleaning with sandpaper will usually be sufficient. Sandpaper should never be used on a nickeled pipe as wiping with a damp cloth or washing with soap or cleaning powder is generally sufficient.

Q.—Can any of the patented type post hole diggers be used to advantage in the digging of holes for telephone poles?

It seems that the average telephone construction man is of the opinion that the only tools he can make use of in the digging of holes to set telephone poles is the long handle shovel, spoon and digging bar. While we will admit that the most ideal arrangement for digging a hole is the power driven earth boring machine, this machine is not within the reach of many of the smaller companies who must continue to dig holes by the old armstrong method. Strange as it may seem, many of these companies don't seem to realize the advantage of patent type hand hole diggers. Farmers all make use of these devices for holes to set fence posts, but for some reason telephone men don't seem to realize they are suited for their needs. Nevertheless, in average soil they are far more satisfactory, easier and quicker for hole digging than the long handled shovel and spoon method.

The auger type diggers are available in sizes that will dig a hole up to 16 inches in diameter, which is large enough for the average pole. Smaller sized augers can be obtained for use in setting smaller poles, such as those used on rural lines. The two-handled diggers are also available with longer handles than the type ordinarily used for fence work. These will dig a hole of almost any size. Many of the larger companies are making use of this tool to good advantage when manual hole digging is used. Some diggers have special features which makes their use possible in stony ground.

Any telephone company will find that the purchase of an assortment of diggers will prove a worth-while investment, as they can be used frequently and to good advantage.

KEMPSTER B. MILLER DIES

Kempster B. Miller of Pasadena, Calif., well-known and popular telephone authority died at his Pasadena home, November 22. Mr. Miller, an author of several books on telephone subjects, was born in Boston, August 14, 1870.

For three years following his graduation from Cornell University in 1893 he was assistant examiner in the electrical division of the United States Patent Office in charge of telephone work.

During the years following, Mr. Miller was connected with several telephone manufacturing, operating and engineering companies, among which were Western Telephone Construction company, Kellogg Switchboard and Supply company, McMeen and Miller, Central Union Telephone company, North Electric Mfg. company, Cook Electric company, Belden Mfg. company, Coventry (England) Automatic Telephones Ltd., New York Telephone company, Bell Telephone company of Canada and American Telephone and Telegraph company.

During these years Mr. Miller wrote "American Telephone Practice," and during the past three years he produced three volumes of his work, "Telephone Theory and Practice."

He is survived by his wife and three daughters.

For 1934

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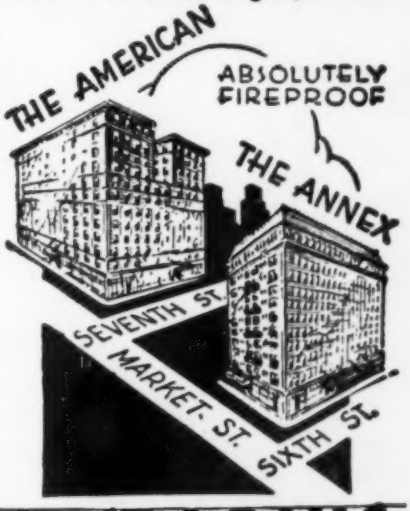

in ST. LOUIS

UNITED INSPECTS TELEPHONES

The United Telephone company of Ohio is conducting a survey for the purpose of inspecting the telephone equipment served by all of its exchanges.

Employees of the company are visiting all subscribers, inspecting the telephone equipment, reporting any repairs needed and receiving complaints or suggestions for improvement of the service. Accurate reports will be made of each inspection and interview and the company expects to remedy any faults discovered, it is said.

Along with the survey a short campaign to gain new subscribers and to sell extension telephones or other service to present subscribers is being conducted.

CITY, COMPANY WORK TOGETHER

For years the Farmington Telephone company of Farmington, Ia., has furnished the city with telephones in the community hall, police and fire stations. Recently, the city council reciprocated by installing an eight day, regulator clock in the telephone office. The citizens of Farmington are thus assured of accurate time signals.

The increased police protection is in the form of a special light on the pole operated from the telephone office switchboard. Upon an alarm being received by central, the light is immediately turned on and the marshal investigates. The light may be seen by the authorities for a considerable distance —day or night.

GETS ORDERS FOR TWO SWITCHBOARDS

The recent purchase of a Kellogg 150-line magneto switchboard by the Yorkville Telephone company, gives Gibson County, Tennessee, the distinction of having seven exchanges operating Kellogg switchboards. The new Kellogg switchboard employs the latest method of operation and will assure Yorkville subscribers of fast and efficient magneto service.

I. C. Pipkin, president of the Yorkville Telephone company, expects to have the new equipment in operation in the near future.

A Kellogg 150-line magneto switchboard was recently purchased by the Lakewood Rural Telephone company for installation in a new community near Tamaqua, Pa.

C. O. Kunkel, general manager of the company, has just completed erection of a new residence in the community and has set aside two rooms in it to house the central office equipment. The board is wired for 100 lines and has 50 lines equipped with code night alarm. The 15-cord circuits feature double drop supervision.

A wall type distributing frame and underground conduits for the cable, help to make this a competent, neat and economically constructed central office. Mr. Kunkel expects to have the exchange complete and operating in the near future.

TELEPHONE ADS PAY

To find out if people are reading the advertising of the telephone company in the newspapers the Southwestern Bell Telephone company made a survey through their employees, in which interviews were had with 26,500 patrons of the company.

One thousand two hundred nineteen had read the advertisement, 4.6 per cent of the newspaper readers, instead of "one out of a thousand," as one official of the company stated before the survey was made.

As many people know advertising is expected to reach not all readers but the profitable percentage who can be interested. Advertising authorities have determined that the average newspaper has a four percent reading public.

Eighty-seven per cent of the ad readers read the ad through, the survey brought to light, and 86.8 per cent gave favorable reactions to the ad, and 81.6 per cent appeared satisfied with the company's rates and practices.

The company expressed satisfaction in the results of their advertising.

341 NEW STATIONS

According to information released recently by officials of the Central Iowa Telephone company, the depression seems to be on the decline in its section if one may judge of general conditions by the condition of their telephone business in the past sixty days.

A check of the exchanges operated by this company which include those at Belle Plaine, Tama, Toledo, Reinbeck, Gladbrook and other points, shows that since early in August the company has installed 590 new telephones and has only disconnected 249 old phones, a net gain in a little better than two months of 341 telephones in use in exchanges operated by the company.

SIGNAL CORPS ORDERS TEMPEROMETERS

The Dillon Manufacturing company, Suite 1216, 63 E. Lake St., Chicago, recently received an order from the United States Signal Corps for Dillon Temperometers to be used in the United States and foreign possessions.

The Temperometers have been shipped to the Army Base, Brooklyn; General Depot, San Francisco; Quartermaster Depot, Chicago; Fort San Houston, Texas; Fort Davis, C. Z.; Panama Pacific General Depot, Corozal, C. Z., and Hawaiian Signal Depot, Fort Armstrong, T. H.

The Temperometer is a newly designed instrument which registers the correct working temperature of wiping solder. It is said by the many cablemen now using these instruments, that they are invaluable in preparing solder for cable work.

The Dillon company, which is carrying a consistent and exclusive advertising campaign in TELEPHONE ENGINEER, has received orders from telephone companies in all parts of this country and in foreign countries.

A. J. BRUMLEVE RESIGNS TELEPHONE POST

A. J. Brumleve has resigned his position as general commercial and general traffic manager for the Illinois Southeastern Telephone company and the Illinois Consolidated Telephone company, which have their headquarters in Mattoon.

Mr. Brumleve has been with the company and its predecessors for the past 24 years. He accepted employment in 1909, advancing gradually to the position which he has just relinquished.

He stated that he will take a rest of three or four weeks and then engage in business for himself.

VIRGINIA OPTIMISTIC

An increase in the number of telephones, seen for the first time in two years, is considered by the Newport News, Va., observers as another bit of evidence that "happy days," if not "here again," at least are on the way.

Telephone men say September showed the first increase seen since 1931 in the number of telephone stations. The increase was maintained at about the same rate in October, and during November has continued in slightly diminished tempo, it was stated.

This growth was not confined to the Newport News area, but was general throughout the state, telephone men said.

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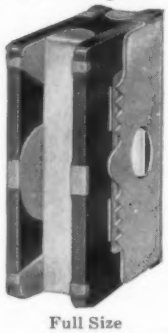

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A REAL UTILITY

In a recent issue of the *Christian Science Monitor* appears an editorial which contains a real definition of the ideal public utility. This definition is as follows:

"The ideal public utility is not difficult to define. It is an organization of men and equipment established and maintained to render first-class service to its customers at reasonable rates based on sound financing of the enterprise, a cultural wage of its employees, and a fair return upon a just capitalization. Such a company has an alert management keen to bring the latest means of utilizing its service to the communities it reaches, eager to lower its unit prices as profitable business increases and to share with its customers' prosperity to which they have contributed. Under the stress of current tax burdens it redoubles its efforts to sell its product, knowing that the best and apparently the only road to prosperity is that of expanding business. It is determined to safeguard so far as possible a fair return to those whose savings have been intrusted to its development, but it is thinking less about constitutional rights than of economical administration, friendly relations with its customers, good treatment of its employees and rendering the full measure of devoted service to those whose patronage enables it to live."

NEW LADDER

A new, simplified ladder and mounting, known as the Keystone Ladder Mount, has been placed on the market by Electric Service Supplies company. It consists of an extension ladder mounted on a tubular base; the ladder proper being rotatable and vertically adjustable to several positions. The complete ladder and mounting base assembly is designed for bolting directly to the bed of a truck body.

This equipment fulfills the need of an economical, adjustable, mounted ladder and has many applications for public utility companies, such as tree trimming, overhead splicing work, general emergency work and numerous small construction and repair jobs.

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Telephone Service Association
1218-63 E. Lake St. Chicago, Illinois

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FOR SALE: 100 Western Electric No. 533 type steel wall telephones @ $5.00 each; 100 enclosed gong steel bell boxes @ $2.00 each, rebuilt by—

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Indianapolis Indiana

ESICO

Electrical Soldering Irons Assure—

QUICK HEAT LONG LIFE

ESICO tools heat quickly and maintain a constant, even temperature enabling workmen to solder steadily and efficiently. GREATER production, HIGHER quality.

Write for details on ESICO irons especially developed for telephone main frames and switchboards.

Electric Soldering Iron Co., Inc.
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Telephones (complete)
Telephones (parts)
Switchboards (complete)
Switchboard (parts)
Central office protection
Relays
Repeating coils

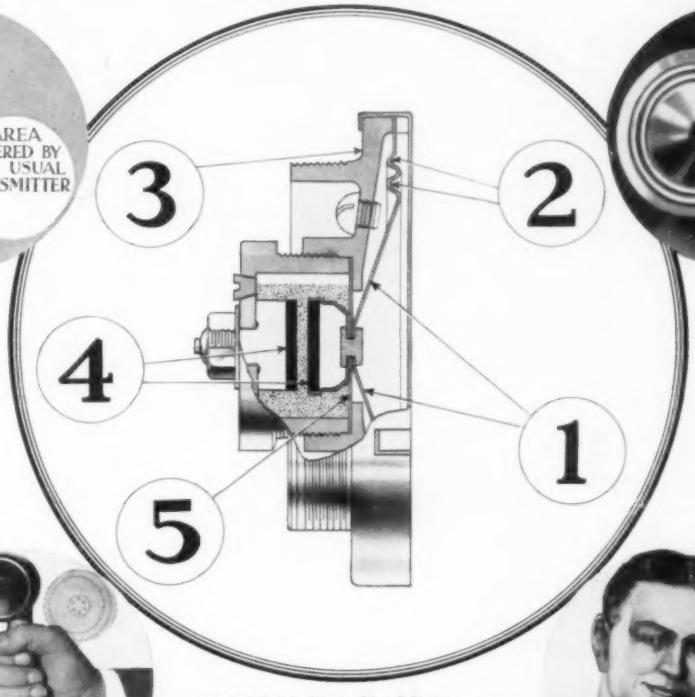
Buckeye Telephone & Supply Company
COLUMBUS, OHIO

Use
Telephone Engineer
CLASSIFIED ADS
They Produce

AREA COVERED BY STROMBERG-CARLSON TYPE 'X' TRANSMITTER 40% GREATER Than Area Covered By The Usual Transmitter
AREA COVERED BY THE USUAL TRANSMITTER

COVERAGE AREA INCREASED MORE THAN 40%

The use of a specially formed, thin guage, light weight outer diaphragm, and an unusually light weight and flexible inner diaphragm in a coordinated design with many other new features, increases transmission efficiency so that the area served by a central energy exchange is enlarged by more than 40%.



ARTICULATION IMPROVED

The conical shape of the diaphragm causes its center to move as a rigid unit with a piston motion. Annular corrugations near the outer edge give the maximum flexibility so that greater movement is gained with the same effort. These features with numerous other features give improved articulation.

1 Conical Center of Outer Diaphragm gives necessary stiffness to unusually light weight—low inertia—construction.

2 Annular Corrugations of outer diaphragm give maximum flexibility where most effective.

ORIENTATION EFFECT MINIMIZED

The shape and size of the carbon chamber and the location of the electrodes are such that regardless of the position of the transmitter there is unusually little change in resistance—far from enough to cause false operation of supervisory signals or to introduce noise.

3 Solid One-Piece Metal Frame accurately machined, holds all parts permanently in correct relative position.

4 Electrodes located so as to give uniformly high gravity pressure of carbon on electrodes at all positions of cup.

5 Inner (auxiliary) Diaphragm of extremely flexible, light weight, non-hygroscopic material.

SILENT OPERATION ASSURED

The electrodes are placed in the carbon cup in such a way that they are subject to the uniformly high gravity pressure of carbon granules, at all positions of the cup, necessary for quiet operation. The inner diaphragm forms an unusually flexible, non-hygroscopic seal which insures quietness by compensating for a wide variation of temperature changes.

STROMBERG-CARLSON
SETS A NEW STANDARD IN TRANSMITTERS

YEARS of experience and development in telephone and radio acoustics have enabled Stromberg-Carlson engineers to design the Type X Transmitter which gives the telephone industry its greatest advancement of recent years.

This type X Transmitter, which is now a part of all Stromberg-Carlson Handsets, applies a principle of radio to the telephone transmitter by using the cone-shaped diaphragm of the radio speaker.

This feature, together with the others illustrated on this page, raises transmission efficiency a minimum of 6 decibels, but in practice several decibels above this.

It brings two important advantages to operating companies:

1: Extended area of operation with present facilities.

2: Vastly improved articulation in present areas of operation.

How important this is in reaching outlying districts for new subscribers or in satisfying critical subscribers in present fields of operation!

Order a test sample of this new transmitter. Test it under your most difficult requirements. We are confident that, like other operating companies, you will proclaim it an outstanding achievement.

Stromberg-Carlson Telephone Manufacturing Co.

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100 CARLSON ROAD, ROCHESTER, N. Y., U. S. A.

Branch Offices:
CHICAGO, KANSAS CITY, SAN FRANCISCO, LOS ANGELES, SEATTLE, TORONTO, ATLANTA

NRA
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Stromberg-Carlson

MAKERS OF VOICE TRANSMISSION AND VOICE RECEPTION APPARATUS FOR MORE THAN THIRTY-FIVE YEARS

AMIDST UNCERTAINTIES SOME HIGH PROBABILITIES

TELEPHONE COMMUNICATION
WILL PERSIST SPREAD INCREASE
AS HERETOFORE

THOSE COMPETENT AND EQUIPPED
TO GIVE GOOD SERVICE ECONOMICALLY
WILL COMMAND THEIR PLACE AND PRICE

AN AUTOMATIC EXCHANGE WILL HAVE
A HIGHER SERVICE-VALUE
A HIGHER EARNING-VALUE
A HIGHER ASSET-VALUE
A HIGHER SALE-VALUE
IF IT SHOULD COME TO THAT

IT WILL SERVE BETTER
IN A PERIOD OF GROWTH
OR STAND BY BETTER
IN A PERIOD OF STAGNATION

THE NORTH-ELECTRIC ALL-RELAY DIAL-AUTOMATIC EXCHANGE

GALION, OHIO